NETKROM OUTDOOR AP/BRIDGE MODELS

AIR-BR500G/GH

AIR-BR500AG

User's Manual

May-06 v1.36

Chapter 1: Product Overview

INTRODUCTION

The AIRNET 54Mb Outdoor AP/Bridge series is a high-performance Access Point and Bridge designed for enterprises and outdoor users. It is compatible with IEEE 802.11a/b/g and supports high-speed data transmission up to 54Mb. Housed in a waterproof casing, AIRNET 54Mb Outdoor AP/Bridge series is designed to withstand any extreme climatic conditions, making it the ideal solution for outdoor applications.

The AIRNET 54Mb Outdoor AP/Bridge series has the ability to operate in 7 different modes and can be used in a wide variety of wireless applications like Point-to-Point, Point-to-Multipoint, Wireless ISP, Hot Spot and Mesh Network applications. The integrated WDS (Wireless Distribution System) feature creates a virtually larger wireless network infrastructure by linking up other access points.

Perfect for applications requiring high bandwidth at a fraction of the cost of T1/E1 leased-line, with the additional advantage of zero monthly recurring cost from the service carrier. Typical usages include bridging satellite offices, corporate LANs, school campus, as well as wireless Internet services, at distances up to 25 miles or 40 Km (using 1 watt amplifier). The Airnet 54Mb Outdoor Bridge High Power also represents the perfect solution for bridging networks that are impossible to connect using wired alternatives, including networks separated by difficult terrains, railroads, or bodies of water.

The AIRNET 54Mb Outdoor AP/Bridge series is based in Atheros eXtended Range (XR) chipset and provides powerful features such as High Power, higher throughput, Long Range Parameter Settings, high security 64/128/152 WEP and WPA2, DHCP Server, Spanning Tree Protocol, Web-based Configuration and QOS feature which allows media files to be delivered over the network more efficiently.

Designed for outdoor use, the AIRNET 54Mb Outdoor AP/Bridge series is able to draw power through Cat-5 Ethernet cable from our DC injector. This ensures that power is available wherever you need it, without the need of expensive electrical work often associated with outdoor installations.

FEATURES AND BENEFITS

- Outdoor and Waterproof Design
- Full IEEE 802.11a/b/g compatibility allows inter-operation among multiple vendors.
- High speed data transfer rate up to 54Mbps
- WDS - Wireless Distribution System
- Long-Range Parameter Settings
- Power over Ethernet - PoE
- Supports 64/128/152 WEP, WPA and WPA2
- SNMP, Web base Management System and Windows-based utility
- Supports Atheros extended Range (XR) technology
- Spanning Tree Protocol
- DHCP Server
- Bandwidth control
- SPI Firewall and packet/URL filtering

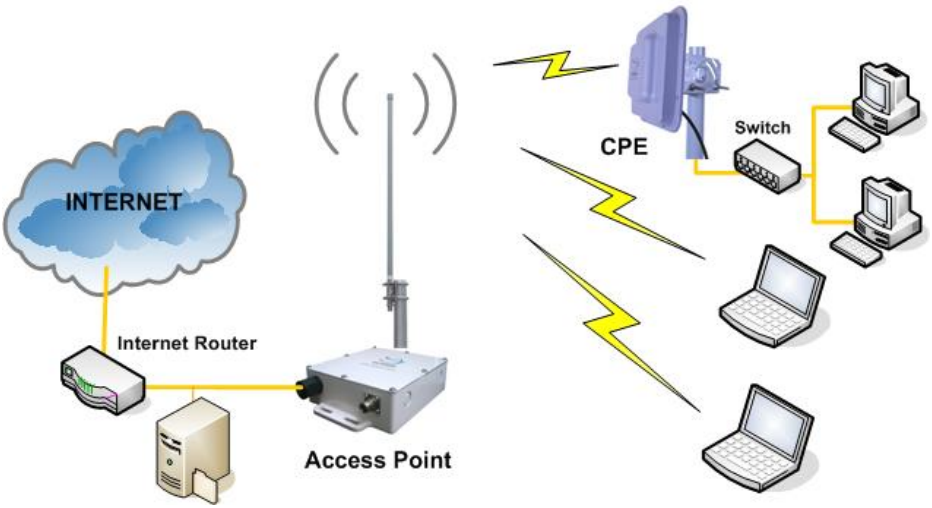
WHEN TO USE WHICH MODE

The access point is versatile in the sense that it may operate in seven different types of modes: **Access Point Mode**, **Client Mode**, **Point to Point, Point to Multiple Point**, **Wireless Routing Client** , **Gateway** and **Wireless Adapter**.

This section presents a brief outline of the different network applications that can be accommodated through the different modes of the access point.

ACCESS POINT MODE

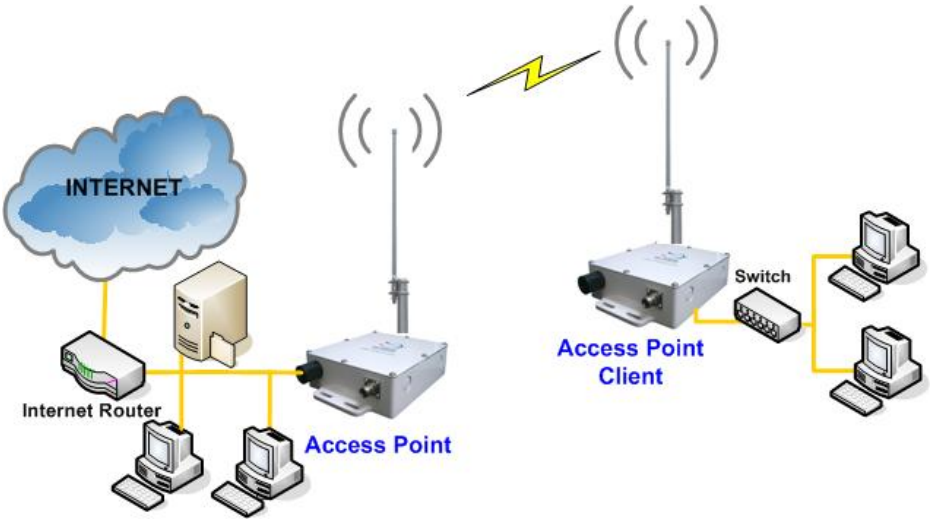
This is the default mode of your access point. The **Access Point** mode enables you to bridge wireless clients to access the wired network infrastructure and to communicate with each other.



In the example above, the wireless users will be able to access the file server connected to the switch through the access point in **Access Point** mode.

ACCESS POINT CLIENT MODE

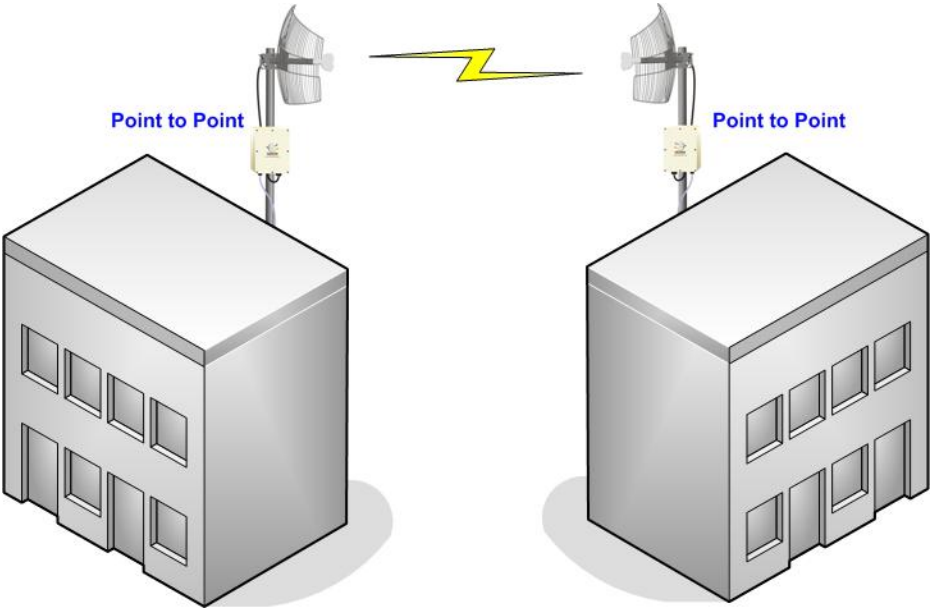
In **Access Point Client** mode, the access point acts as a wireless client that can operate wirelessly with another access point to perform bridging between two Fast Ethernet networks. The Access Point client cannot communicate directly with any other wireless device.



In the example above, the workgroup PCs will be able to access the PCs connected to the access point in **Access Point Client** mode.

POINT TO POINT MODE

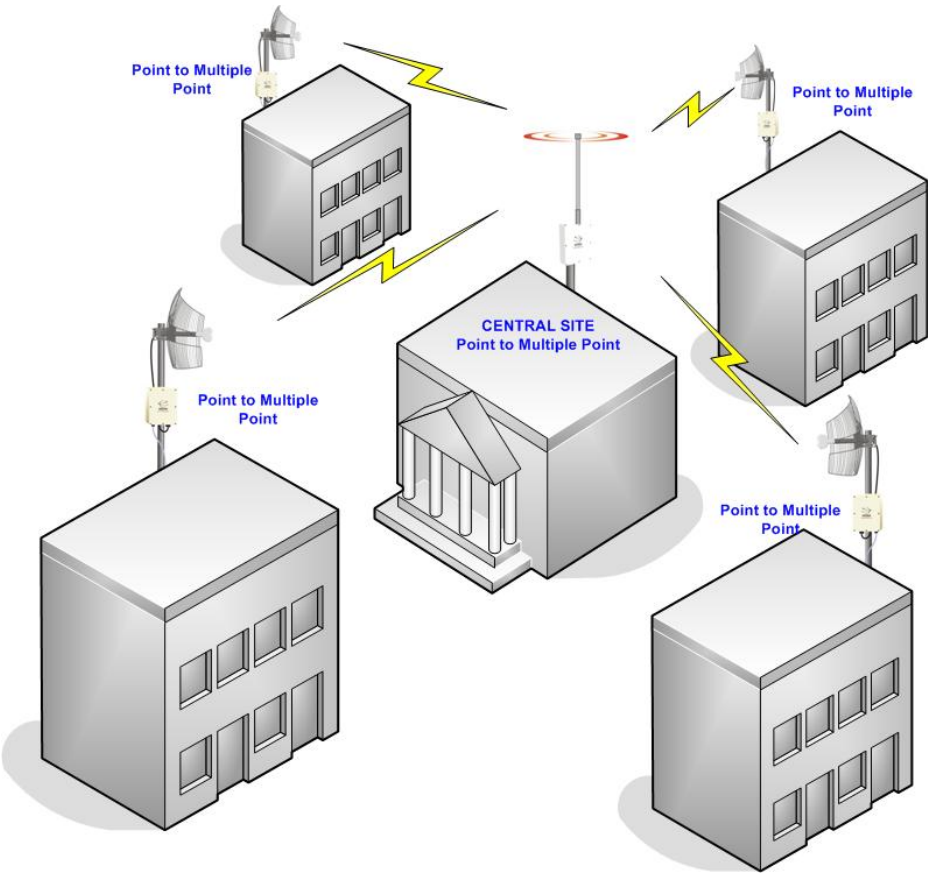
In **Point to Point** mode, the access point allows point-to-point communication between different buildings. It enables you to bridge wireless clients that are miles or kilometers apart while unifying the networks.



In the example above, you may configure two access points (AP) to perform transparent bridging between two buildings

POINT TO MULTIPLE POINT MODE

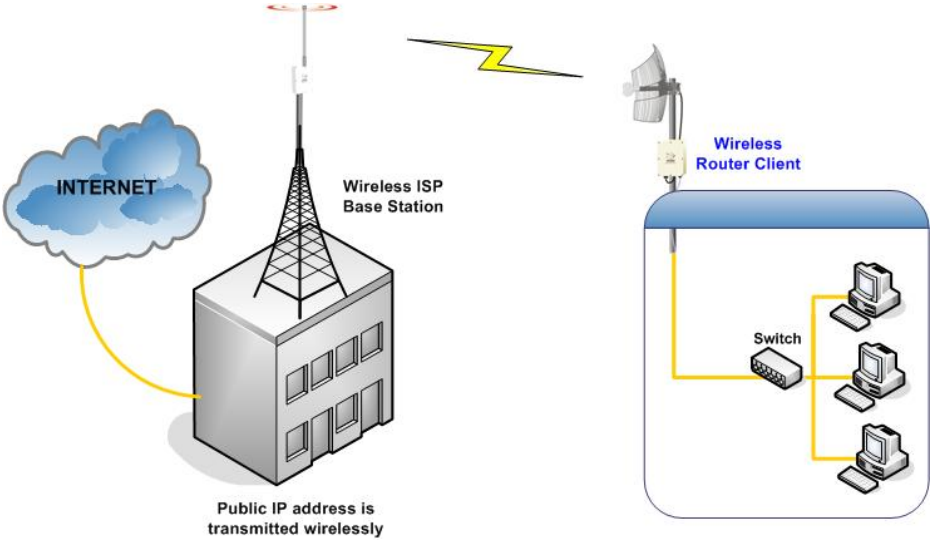
In **Point to Multiple Point** mode, this mode is similar to that of the Point to Point mode. But the access point located at one facility is able to connect to up to 8 access points (AP) installed in any direction from that facility.



The above illustration describes how this mode operates.

WIRELESS ROUTING CLIENT MODE

An application of this mode would be for the Ethernet port of the **Wireless Routing Client** to be used for connection with other devices on the network while access to the Internet would be achieved through wireless communication with wireless ISP.

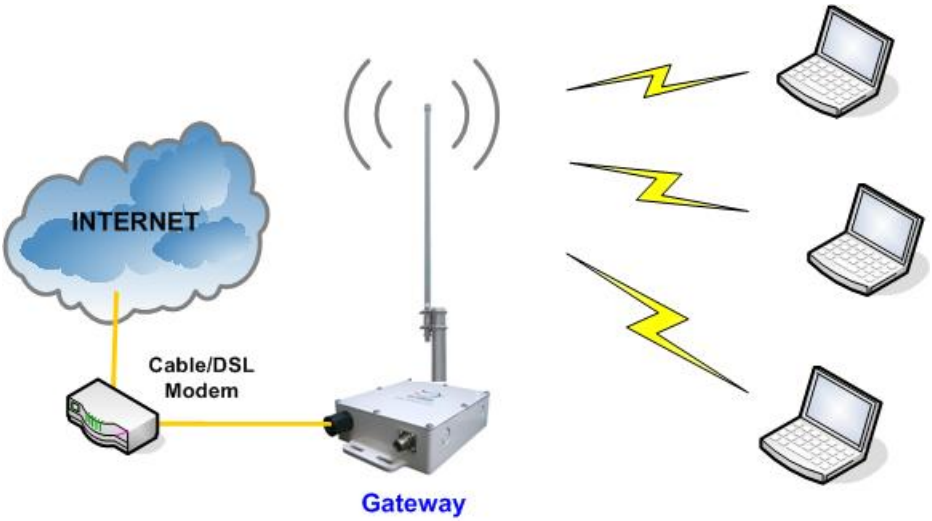


The above illustration describes how this mode operates.

GATEWAY MODE

Or put it more simply, Broadband Internet sharing in a wireless network!

Since the access point supports several types of broadband connections, the first step in setting up the access point as a *Broadband Internet Gateway* is to identify the type of broadband Internet access you are subscribed to.



Static IP address
Use this type of connection if you have subscribed to a fixed IP address or to a range of fixed IP addresses from your Internet Service Provider.

Dynamic IP address
When powered using this type of connection, the access point requests for an IP address which will be automatically assigned to it by your Internet Service Provider.

This type of connection applies for instance, to:

- Singapore Cable Vision subscribers
- @HOME Cable Service users

PPP over Ethernet (PPPoE)
Select this type of connection if you are using ADSL services in a country utilising standard PPP over Ethernet for authentication.

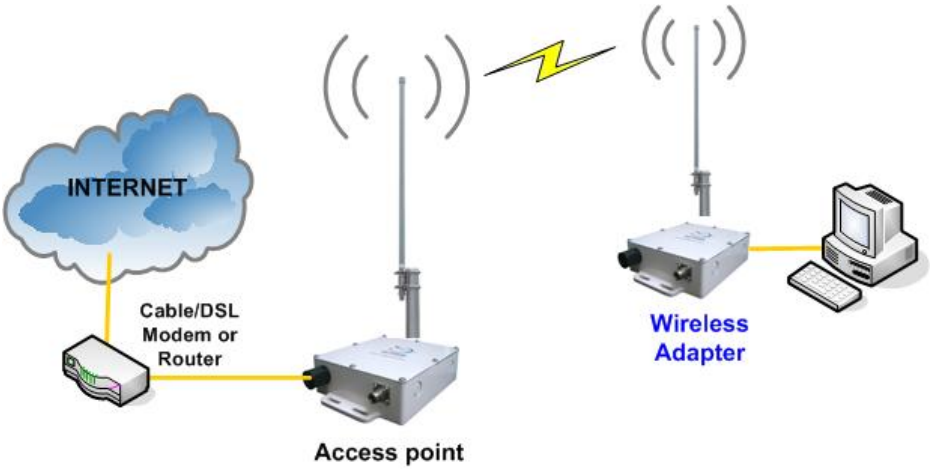
For instance:
If you are in Germany which uses T-1 connection or
If you are using SingNet Broadband or Pacific Internet Broadband in Singapore.

PPTP
Select this type of connection if you are using ADSL services in a country utilising PPTP connection and authentication.

WIRELESS ADAPTER MODE

Similarly to the Access Point Client mode, the access point used in this mode, is able to communicate wirelessly with another access point to perform transparent bridging between two networks.

However here, the **Wireless Adapter** connects a single wired workstation only. No client software or drivers are required while using this mode.



Chapter 2: Hardware Installation

WARNINGS

• Do not work on the system or connect or disconnect cables during periods of lightning activity.

• Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, as they may cause serious injury or death.

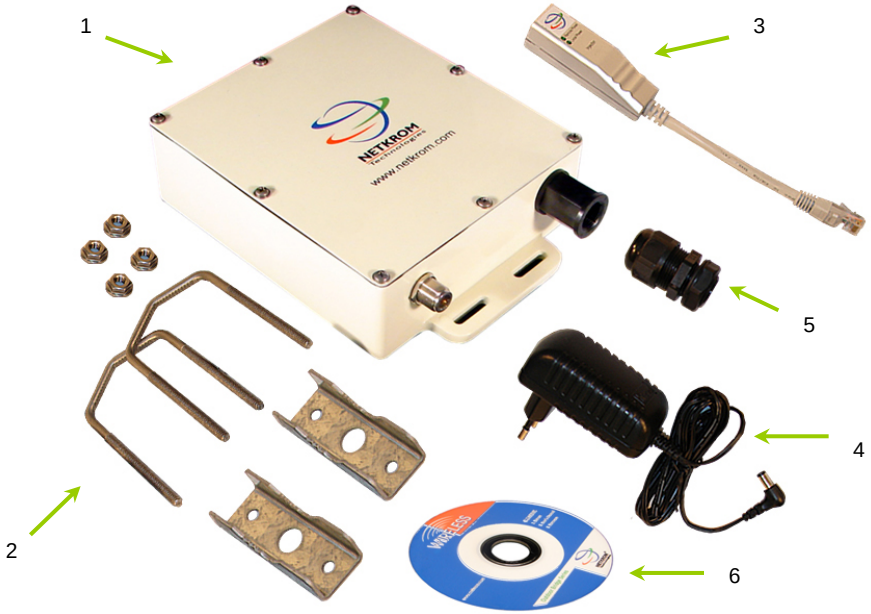
• Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

• To meet regulatory restrictions, the radio and the external antenna must be professionally installed. The network administrator or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password protected by the network administrator to maintain regulatory compliance.

•The outdoor access point and PoE injector can be damaged by incorrect power application. Read and carefully follow the installation instructions before connecting the system to its power source.

PACKAGE CONTENTS

Take a moment to ensure you have all of the following parts in your Outdoor Waterproof Unit installation kit before you begin installing the product. If any parts are missing, please contact your local vendor or contact us at 305-4182232.



KIT CONTAINS

1. Airnet Outdoor Access Point
2. Mounting bracket (include: 2 stainless steel U-Bolt, 2 Brackets and 4 screw nuts
3. PoE Injector
4. 100-240v Power supply
5. RJ45 Waterproof Connector System
6. CD ROM

SETUP REQUIREMENTS

Before starting, please verify that the following is available:

- CAT5/5e or FTP Outdoor Ethernet cable (from the Outdoor AP to PoE Injector)
- At least one computer is installed with a Web browser and a wired or wireless network interface adapter
- TCP/IP protocol is installed and IP address parameters are properly configured on all your network's nodes

Important!

• Configure and verify the outdoor access point operations first before you mount the unit in a remote location.

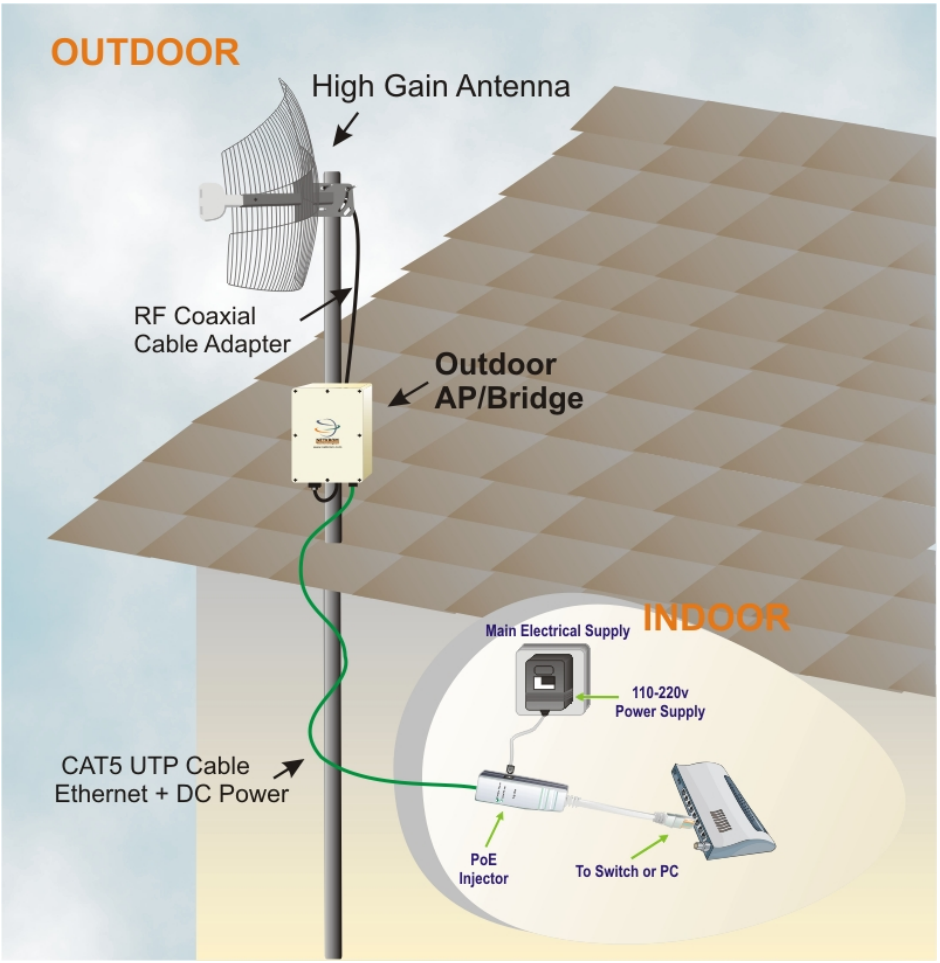
• You may need to install a lightning arrestor to protect your outdoor Access Point from the lightning.

• For choosing the best location for your outdoor access point choose an elevated location where trees, buildings and large steel structures will not obstruct the antenna signals and which offers maximum line-of-sight propagation with the users.

• Select an appropriate antenna to improve range and/or coverage and the access point also lets you fine-tune parameters such as the transmit power to achieve the best results.

OUTDOOR AP INSTALLATIONS

The diagram below shows the overall setup of Outdoor Access Point.



Step 1:

Connect your UTP or FTP Outdoor cat.5 Ethernet cable with waterproof connector to the RJ-45 connector on the outdoor access point. Then connect the other end of the cable to the PoE injector.

For the Netkrom PoE, the recommended length of the RJ45 Category 5 cable is up to 150 feet or 50 meters.

1.- Remove the thin enclosure nut from the feedthru assembly. This can be discarded. Loosen the compression nut completely

2.- Insert the RJ45 connector thru the feedthru assembly

3.- Tighten the compression nut loosely to the feedthru assembly

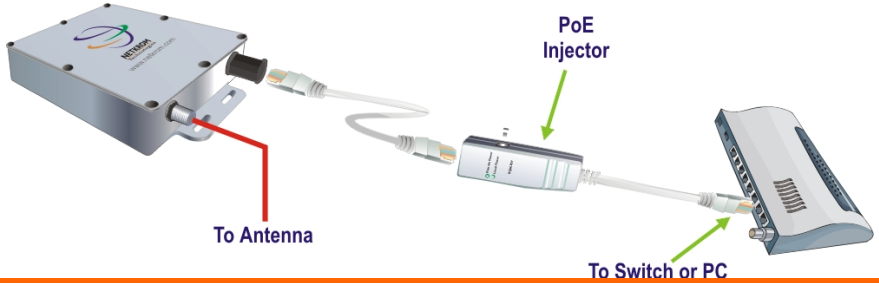
4.- Screw the entire feedthru assembly into the RJ45-ECS housing which is already mounted in the enclosure. There should be a rubber gasket between the two assemblies. Tighten the feedthru assembly to create a seal.

5.- The final step is to tighten the compression nut until the gaskets are tight around the Cat5 cable. Always push the cable toward the connector while tightening to ensure good strain relief of cable to connector.

Step 2:

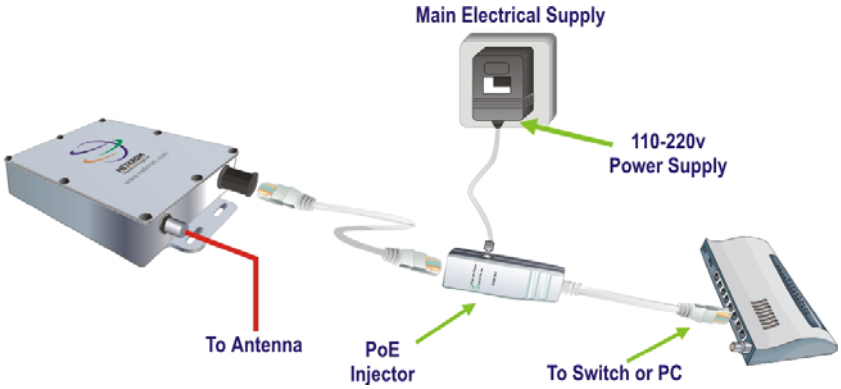
Connect the external antenna to the N Female connector of the access point.

Connect the RJ45 Ethernet cable attached to the Netkrom PoE Injector to a switch or PC you will use to configure the access point.



Connect the power adapter supplied in the Netkrom PoE kit to the main electrical supply and the power plug into the socket of the injector.
Now, turn on your power supply. Notice that the POWER LED has lighted up. This indicates that the access point is receiving power through the Netkrom PoE Injector and that connection between your access point and your network has been established.

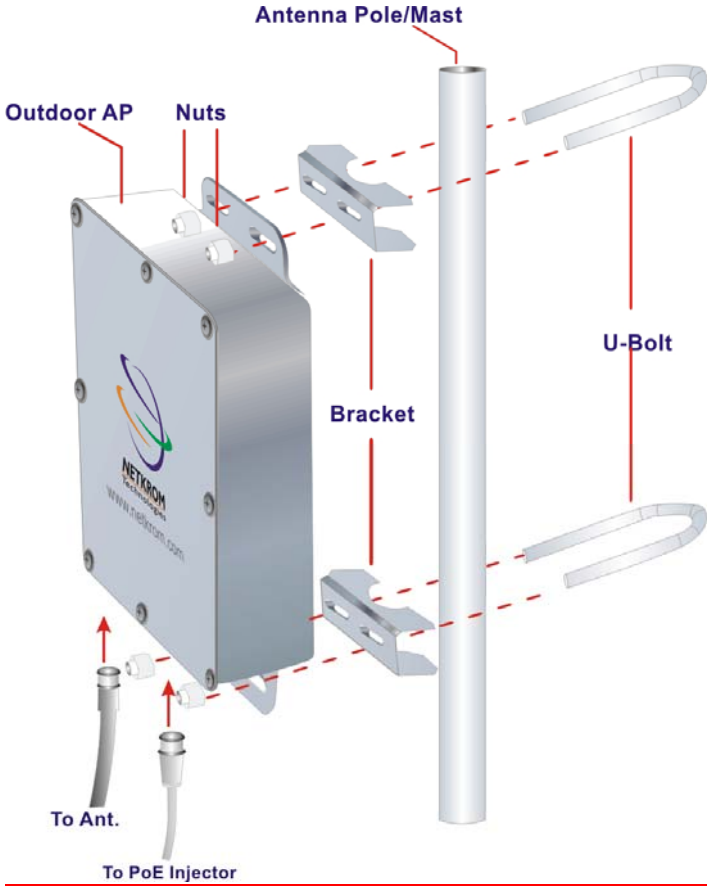
Note:
Please use the power adapter provided in the package. Using a power adapter with a different voltage rating will damage this product.



MOUNTING AP IN THE POLE OR TOWER

Outdoor Access Point device can be mounted on the pole or tower as shown in following:

1.-Mount the bracket to the pole with the U-bolts.
2.- Attach the radio to the bracket which was mounted on the pole with the supplied nuts and U-bolts.
3.- Tighten the U-bolts and nuts with hand tools.



Chapter 3: Access to Web-based Interface

There are two methods to access to the web-based Interface of your access point:

- **Through our Utility – uConfig**
  You can access to the web-based interface directly without the need to assign a different IP address to your PC.

- **By entering the IP address of Access point in the address bar of Internet Explorer**
  You need to assign an IP address to your PC, such as 192.168.168.x, where **x** can take any value from 2 to 254, so that it is in the same subnet as Access point.

ACCESS TO THE WEB INTERFACE WITH UCONFIG

The powerful uConfig utility has been designed to give you direct access to the Web interface.

Step 1:

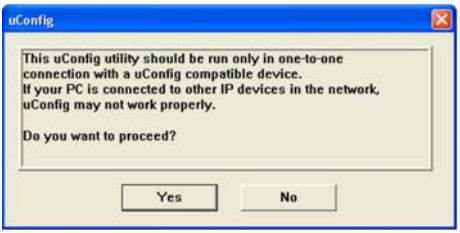
Insert the Product CD into your CD-ROM drive. The CD will run automatically.

Step 2:

From the **Utilities** section, select to install the **uConfig** utility to your hard disk.

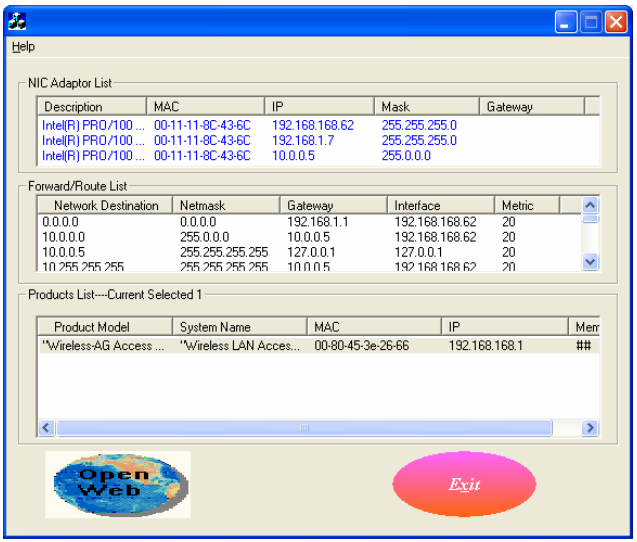
Step 3:

When the utility has been installed, double-click on the **uConfig** icon. The following screen will appear, click on the **Yes** button to proceed.



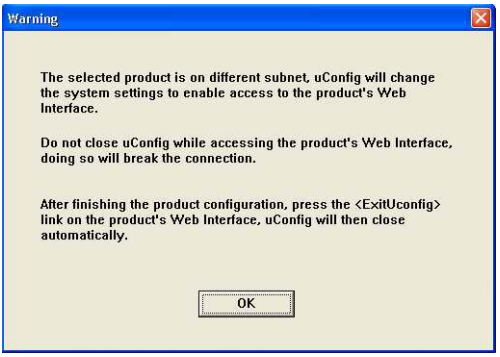
Step 4:

Select ***Wireless-AG Access Point*** in the **Products List** section and click on the **Open Web** button. To retrieve and display the latest device(s) in the list, click on the **Refresh** button.



Step 5:

Do not exit the uConfig program while accessing to the web-based interface. This will disconnect you from the device. Click on the **OK** button to proceed.

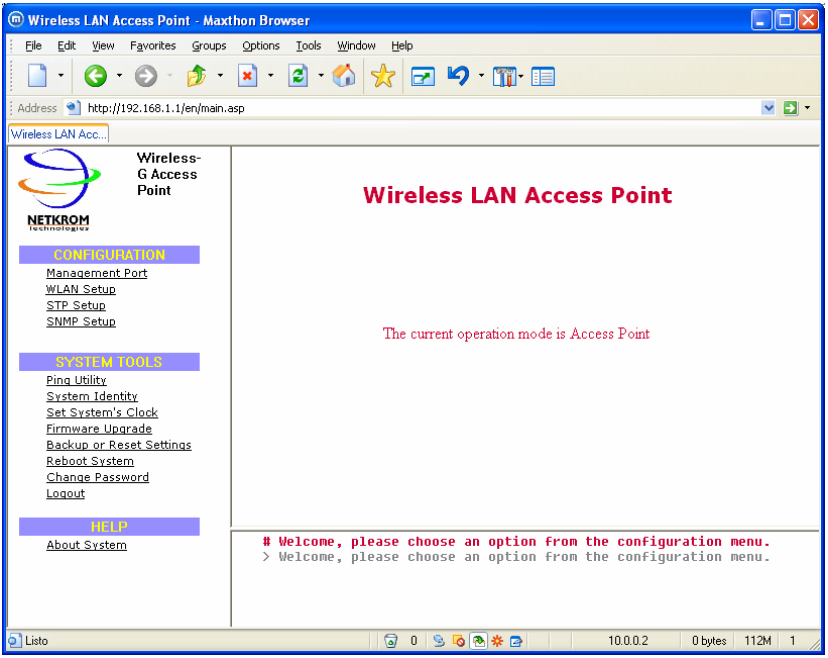


Step 6:

At the login page, press the **LOGIN!** button to enter the configuration page. The default password is "password".

Step 7:

You will then reach the home page of your access point's web-based interface.



VERIFY THE IP ADDRESS OF THE ACCESS POINT WITH NPFIND

Another utility program **NpFind**, intended to help you verify the IP address of your product.

Follow the next steps to check the IP address of your access point.

Step 1:

Insert the Product CD into the CD-ROM drive. It will automatically run.

Step 2:

Click on **Utilities** and select **NpFind** program to run it.

The screen will then display the IP address of the device detected.

MANUAL ACCESS TO WEB-BASED INTERFACE VIA INTERNET EXPLORER

For this method, you need to assign an IP address to your PC so that it belongs to the same subnet as your access point. In this example, we are using Windows XP for illustration. For Windows 98/98SE/2000/NT/ME, kindly refer to **Appendix II "TCP/IP Configuration".**

Step 1:

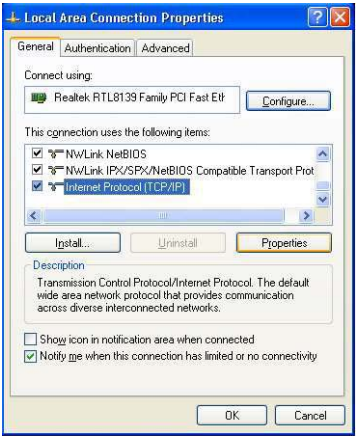
Go to your desktop, right-click on **My Network Places** icon and select **Properties**.

Step 2:

Go to your network adapter icon, right click and select **Properties**.

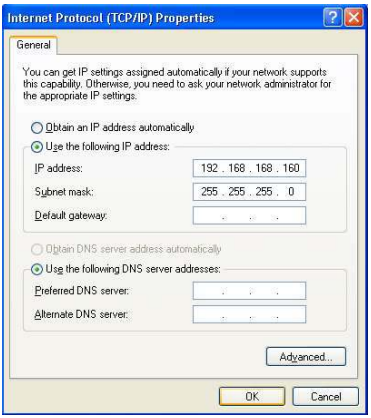
Step 3:

Highlight **Internet Protocol (TCP/IP)** and click on the **Properties** button.



Step 4:

Select the radio button for **Use the following IP address**. Enter the IP Address and Subnet Mask as 192.168.168.**x** and 255.255.255.0, where **x** can be any number from 2 to 254, except 1. In this example, we are using 192.168.168.160 as the static IP Address.

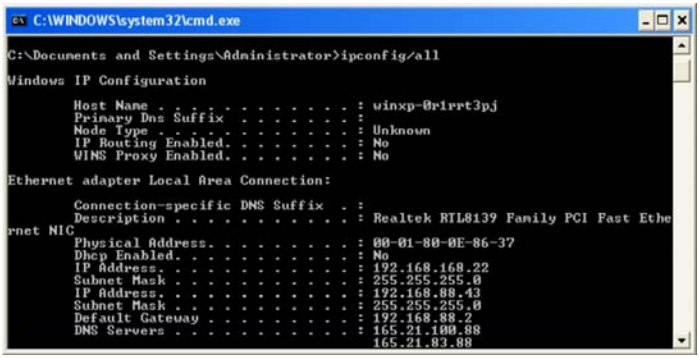


Step 5:

Click on the **OK** button to close all windows.

Step 6:

Next, in order to check if the IP address has been correctly assigned to your PC, go to **Start** menu, **Accessories**, select **Command Prompt** and type the command *ipconfig/all*.



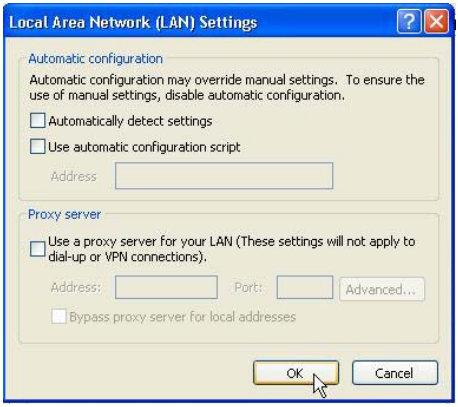
Your PC is now ready to configure your access point.

Step 7:

Launch your Web browser. Under the **Tools** tab, select **Internet Options**.

Step 8:

Open the **Connections** tab and in the **LAN Settings** section, disable all the option boxes. Click on the **OK** button to update the changes.



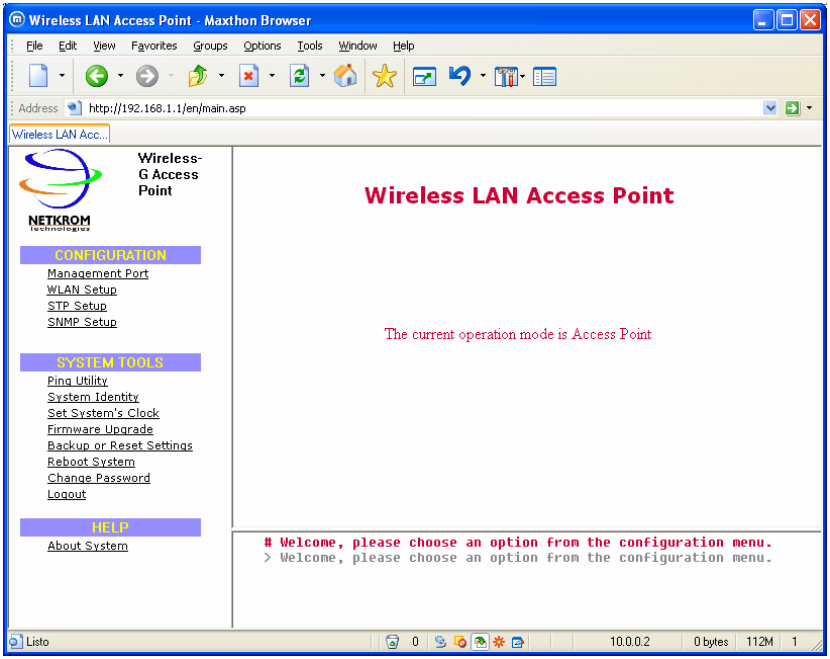
Step 9:

At the **Address** bar, enter http://192.168.168.1 and press **Enter** on your keyboard.

Step 10:

At the login page, click on the **LOGIN!** button to enter the configuration pages.

You will then reach the home page of your access point's Web interface.



Chapter 4: Common Configuration

This chapter illustrates the following features, which are available in ALL the operating modes of your access point, unless stated otherwise.

- Management Port
- WLAN Basic Setup
- WLAN Security
- STP Setup
- SNMP
- MAC Filtering
- Antenna Alignment

MANAGEMENT PORT SETUP

This section shows you how to customize the parameters of your access point to suit the needs of your network. It also explains how to make use of the built-in DHCP server of your access point.

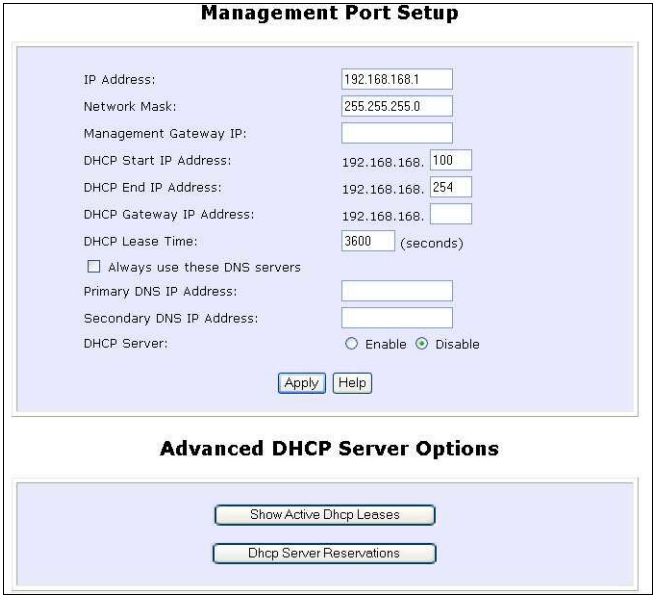
SETTING UP YOUR LAN

You can opt to adjust the default values of your access point and customize them to your network settings.

Step 1:

Click on **Management Port** from the **CONFIGURATION** menu.

In the **Management Port Setup** page, refer to the table below to replace the default settings of Access point with appropriate values to suit the needs of your network.



Step 2:

Click on the **Apply** button to save your new parameters.

This table describes the parameters that can be modified in the **Management Port Setup** page.

Parameters	Description
IP Address	When the DHCP server of the access point is enabled (unless you set a different **DHCP Gateway IP Address**), this LAN **IP Address** would be allocated as the Default Gateway of the DHCP client. The IP address of your Access point is set by default to ***192.168.168.1***.
Network Mask	The Network Mask serves to identify the subnet in which your Access point resides. The default network mask is ***255.255.255.0***.
Management Gateway IP	(Optional) As a bridge Access Point, the access point does not usually communicate with devices on other IP subnets. However, the Management Gateway here acts as the equivalent of the Default Gateway of a PC, to allow the access point to communicate with devices on different subnets. For instance, if you want to access the access point from the Internet or from a router on the LAN, you can set the IP address of the access point as the **Management Gateway IP**. The Management Gateway IP address of your access point is set to nil by default.
The next two fields (**DHCP Start IP Address** and **DHCP End IP Address**) allow you to define the range of IP addresses from which the DHCP Server can assign an IP address to the LAN.	
DHCP Start IP Address	This is the first IP address that the DHCP server will assign. The value that you input here should belong to the same subnet as your access point. For example, if the IP address and network mask of your access point are 192.168.168.1 and 255.255.255.0 respectively, the DHCP Start IP Address should be 192.168.168.X, where X can take any value from 2 to 254. It is pre-set to ***192.168.168.100***.
DHCP End IP Address	This is the last IP address that the DHCP server can assign. It should also belong to the same subnet as your access point. For instance, if the IP address and network mask of your access point are 192.168.168.1 and 255.255.255.0 respectively, the DHCP End IP Address should be 192.168.168.X, where X can take any value from 2 to 254. It is pre-set as ***192.168.168.254*.**

Parameters	Description
DHCP Gateway IP Address	Though usually, the DHCP server also acts as the Default Gateway of the DHCP client, the access point gives you the option to define a different **DHCP Gateway IP Address**, which will be allocated as the Default Gateway of the DHCP client. The

	DHCP client will thus receive its dynamic IP address from the access point but will access to the Internet or to the other LAN through the Default Gateway defined by the **DHCP Gateway IP Address**. For instance, if the access point is used in Access Point Client mode and connects to an Internet gateway, **X**, a PC wired to the access point will be unable to obtain a dynamic IP address directly from **X**. But if you can enable the DHCP server of the access point and set the IP address of **X** as the **DHCP Gateway IP Address**, the PC will then obtain its IP address from the access point and access the Internet through **X**.
Always use these DNS servers	Enable this checkbox if you want the access point to only use the DNS server(s) you have specified below.
Primary DNS IP Address	The IP address of the DNS server is usually provided by your ISP.
Secondary DNS IP Address	This optional field is reserved for the IP address of a secondary DNS server.
DHCP Server	If you disable the DHCP server, you will need to manually configure the TCP/IP parameters of each computer in your network.

TO VIEW THE ACTIVE DHCP LEASES

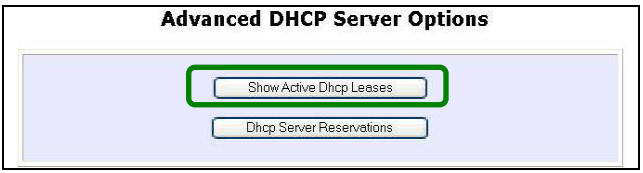
The following will guide you to a page display of the active IP address leases that have been allocated by the built-in DHCP server of Access point.

Step 1:

Click on **Management Port** from the **CONFIGURATION** menu.

Step 2:

Go to the **Advanced DHCP Server Options** section, click on the **Show Active DHCP leases** button.



The **DHCP Active Leases** table displays:

- The **Host Name** of the DHCP client
- The **IP Address** that has been allocated to the DHCP client
- Its **Hardware (MAC) Address**
- The date and time at which the IP address leased **expires**

NOTE

Invalid date and time displayed in the **Lease Expired Time** column indicates that the clock of your access point has not been properly set. Please refer to the **SYSTEM TOOLS** section for more details on how to set the system clock.

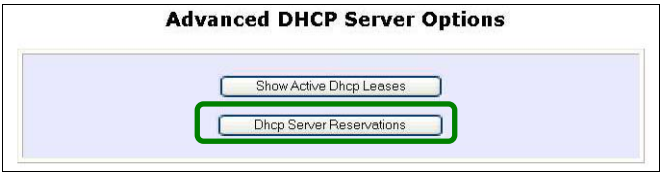
TO RESERVE SPECIFIC IP ADDRESSES FOR PREDETERMINED DHCP CLIENTS

Making an IP address reservation lets you inform the DHCP server to exclude that specific address from the pool of free IP addresses it draws on for dynamic IP address allocation.

For instance, if you set up a publicly accessible FTP/HTTP server within your private LAN, while that server would require a fixed IP address, you would still want the DHCP server to dynamically allocate IP addresses to the rest of the PCs on the LAN. The following shows you how to reserve a particular IP address.

Step 1:

From the **Advanced DHCP Server** Options section, click on the **DHCP Server Reservations** button.



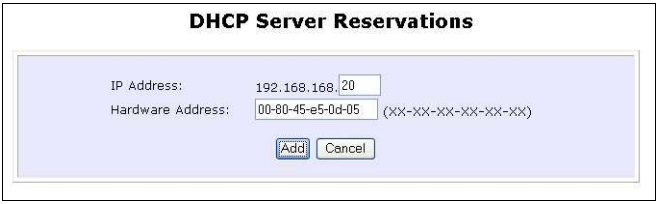
Step 2:

Click on **Add** button.

Step 3:

Fill in:
The host portion of the **IP Address** to reserve.
The **Hardware Address**, in pairs of two hex values

Press the **Apply** button to make your new entry effective.



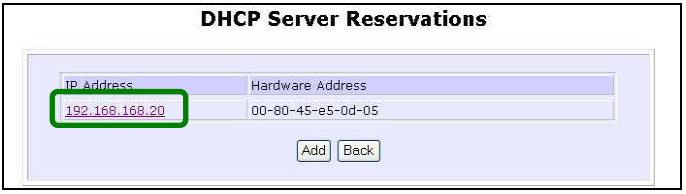
The **DHCP Server Reservations** page will then be refreshed to illustrate the currently reserved IP addresses.

DELETE DHCP SERVER RESERVATION

If you do not need the DHCP server to reserve an IP address anymore, you can delete the DHCP Server Reservation.

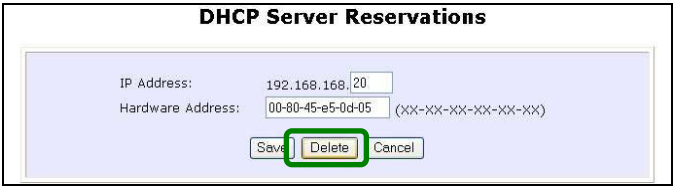
Step 1:

Click on the reserved IP address that you wish to delete, e.g. *192.168.168.20*.



Step 2:

Click on the **Delete** button.



The **DHCP Server Reservations** table will then be refreshed to reflect your changes.

WLAN SETUP

This section shows how to perform the following functions:

Basic:
This function performs a basic setup of the wireless modes of operation: **Access Point mode**, **Access Point Client mode** and other operating modes.

Security:
This function performs data encryption and protection for the access point.

Kindly refer to Chapter 5 on **WLAN Security** for details.

Advanced:
This function furthers the basic configuration of the access point by setting the system's additional parameters: **Wireless Pseudo VLAN**, **WDS Configuration** and **Long Distance Parameters**.

Kindly refer to Chapter 6 on **Wireless Extended Features** for details.

Statistics:
This function uses the **Scan Feature** to monitor and interpret the statistics data collected.

MAC Filtering (only applicable to Access Point mode):
MAC Filtering acts as a security measure by restricting the users accessing to the network through their MAC address.

Antenna Alignment:
It is a tool for aligning outdoor antenna between 2 access points over long distances. The signal level can be checked from the web page and also from the DIAG LED indicator.

The DIAG LED indicates the signal strength as described below:

Signal Strength	Status of DIAG LED
Above 20dBm	Stays turned ON

Between 19 and 17 dBm	Flashes 6 times
Between 17 and 14 dBm	Flashes 3 times
Between 13 and 10 dBm	Flashes ONCE
Below 10dBm	Turns OFF

NOTE
The signal strength of below 10dBm is not recommended for outdoor long distance connection.

TO CONFIGURE THE BASIC SETUP OF THE WIRELESS MODE

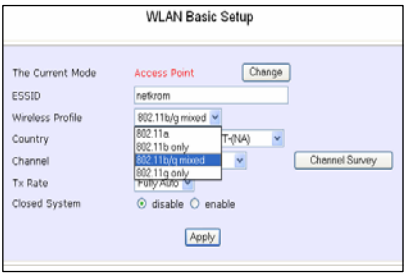
The following will guide you to configure the basic setup of the wireless mode you have selected.

Step 1:

Click on **WLAN Setup** from the **CONFIGURATION** menu. You will see the sub-menus expanded under **WLAN Setup**. Click on **Basic**.

The default operating mode of the access point is the **Access Point** mode.

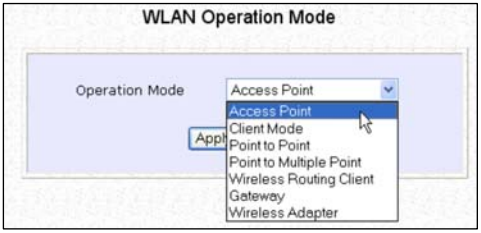
AIR-**BR500G/GH**



AIR-**BR500AG**

Step 2: (Optional: Change Current mode)

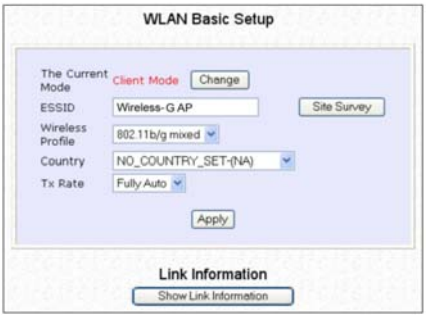
If you wish to change the current mode of your access point, click on **Change**, select your **Operation Mode** and click on the **Apply** button to access the setup page of your selected mode. Then you are prompted to reboot the access point so as to effect the mode setting.



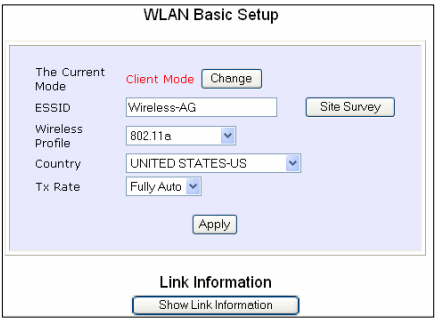
Step 3:

Enter the parameters in their respective fields, click on the **Apply** button and reboot your device to let your changes take effect.

Note that the **WLAN Basic Setup** page for the **Client** mode is different from that of the **Access Point** mode.

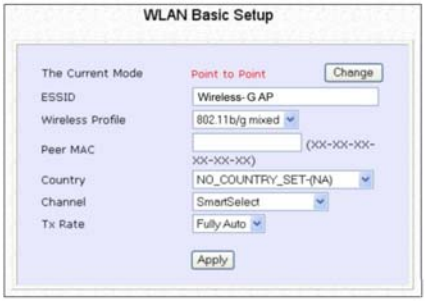


AIR-**BR500G/GH**

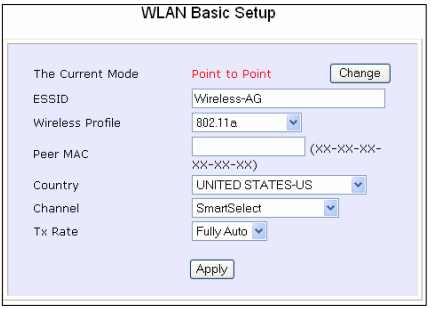


AIR-**BR500AG**

If you wish to set the access point in the **Point to Point** mode, click on **Change** to select **Point to Point**, and then you will see the page below.

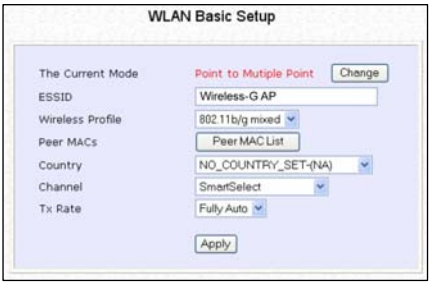


AIR-BR500**G/GH**

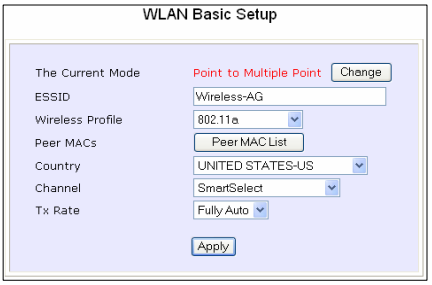


AIR-BR500AG

If you wish to set the access point in the **Point to Multiple Point** mode, click on **Change** to select **Point to Multiple Point**, and then you will see the page below.

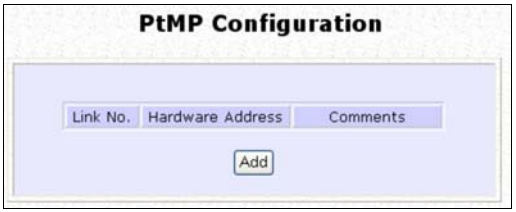


AIR-BR500**G/GH**



AIR-BR500AG

To create a new peer MAC, click on the **Peer MAC List** button. The page will appear. (Please take note that **PtMP** stands for **P**oint to **M**ultiple **P**oint).



Click on **Add**, and then you are prompted to key in **Hardware Address** and **Comment**.

This table describes the parameters that can be modified in the **WLAN Basic Setup** page.

Parameters	Description
The Current Mode	The default operating mode of the access point is the **Access Point** mode. The access point can operate in 7 modes: • Access Point • Client • Point to Point • Point to Multiple Point • Wireless Routing Client • Gateway • Wireless Adapter You can toggle the mode by clicking on the **Change** button.
ESSID	Enter a preferred name for the wireless network. Your wireless clients must be configured with the same ESSID. This case-sensitive entry can consist of a maximum of 32 characters.
Site Survey	A list of wireless devices that are detected by your access point in the WLAN. Information such as MAC address, channel, SSID, algorithm and signal strength can

	be found in the listing. This feature is supported by the Access Point Client and Wireless Routing Client modes.
Wireless Profile	A selection of network environment types in which to operate the access point: • **802.11a only (only for AIR-BR500AG)** This mode supports wireless A clients with data rates of up to 54 Mbps in the frequency range of 5.8 Ghz. • **802.11b only (Available for AIR-BR500G/GH and AG)** This mode supports wireless B clients with data rates of up to 11Mbps in the frequency range of 2.4GHz. • **802.11b/g mixed (Available for AIR-BR500G/GH and AG)** This mode supports both wireless B and G clients. • **802.11g only (Available for AIR-BR500G/GH and AG)** This mode supports wireless-G clients that offer transmission rates of up to 54Mbps in the 2.4GHz frequency band.
Peer Mac (Only in Point-to-Point mode)	This mode can support more than one access point. This feature allows you to create a new peer MAC for another access point so that the router operating in the access point mode can connect to another access point.
Peer MACs (Only in Point-to-Multiple Point mode)	This mode can support up to 15 access points. This feature allows you to create up to 15 peer MAC addresses so that the router can connect to this number of the access points.
Country	Choose the **Country** where you are located.
Channel	This option allows you to select a frequency channel for the wireless communication. This parameter is only available in the Access Point, Point to Point and Point to Multiple Point modes.

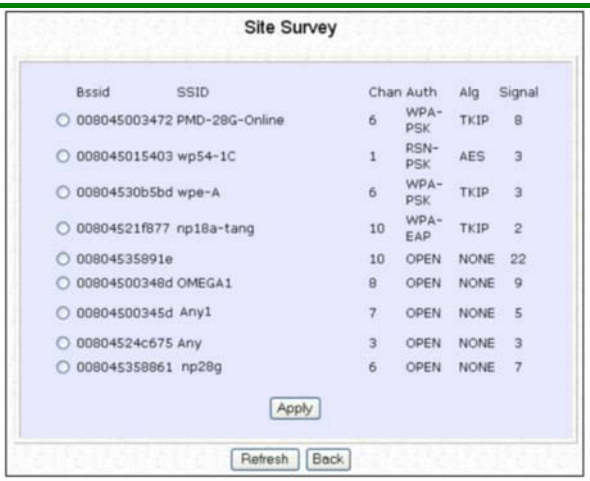
Tx Rate	Allow you to choose the rate of data transmission from **1Mbps** to **Fully Auto (AIR-BR500G/GH)** and from **6Mbps** to **Fully Auto (AIR-BR500AG**)
Closed System	The access point will not broadcast its **WLAN name (ESSID)** when **Closed system** is enabled. By default **Closed system** is disabled.
Channel Survey	A list of channels that are detected by your access point in the WLAN. Information such as frequency, channel, MyQuality, NeighQuality, APCount and Recommendation can be found in the listing. The Access Point and Gateway modes support this feature.

SCAN FOR SITE SURVEY
(ONLY FOR CLIENT MODE AND WIRELESS ROUTING CLIENT MODE)

Step 1:

In the **Mode Setup** page, click on the **Site Survey** button.

The **Site Survey** provides a list of the **MAC addresses (BSSID)** and **SSID** of neighbouring access points detected, the **Chan** (channels), **Auth** (Authentication), **Alg** (Algorithm) used, and the strength of the **Signal** received.



Site Survey on the 2.4 Ghz frequency band

Step 2:

To connect the access point client to one of the access points detected: Select the radio button corresponding to the access point you want to connect to.

Step 3:

Click on the **Apply** button to effect the change and return to the setup page.

Step 4:

Click on the **Refresh** button to update this screen.

This table describes the read-only parameters of neighbouring access points that can be viewed from the **Site Survey** page.

Parameters	Description
Bssid	In an infrastructure wireless network, the BSSID refers to the wireless MAC address of the access point.
SSID	Refers to the network name that uniquely identifies the network to which the access point is connected.
Chan	Refers to the channel being used for transmission.
Auth	Refers to the types of authentication, such as WPA, WPA-PSK, etc being used by the access point.
Alg	Refers to the types of algorithm, such as WEP, TKIP, etc being used by the access point.
Signal	Describes the strength of the signal received in percentage.

NOTE

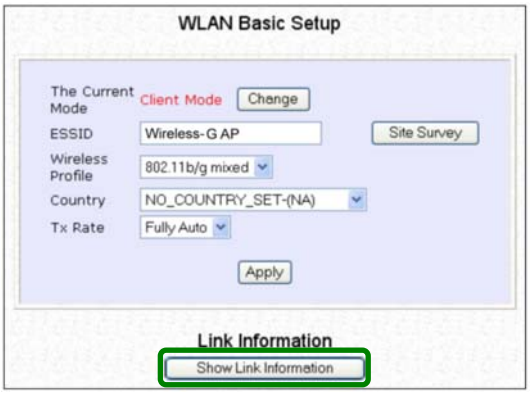
The purpose of using **Site Survey** is to scan and display all access points based on the current security setting of your access point. For instance, the following information supplied by the Site Survey according to the security setting is explained:

- If the security mode is set to **None** or **WEP**, the scan will show all available access points that have no security or WEP security
- If the security mode is set to **WPA-PSK**, the scan will show all available access points having all types of security from **no** security, **WEP** security to **WPA-PSK** security.

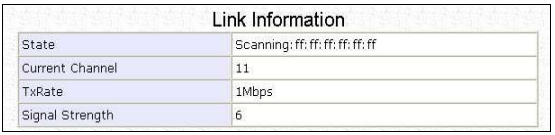
SHOW LINK INFORMATION
(ONLY FOR CLIENT MODE AND WIRELESS ROUTING CLIENT MODE)

Step 1:

To view the connection status when the access point client is linked to another access point, click on the **Show Link Information** button.



The **Link Information** table illustrates the following data:



Link Information

State	Scanning: ff: ff: ff: ff: ff: ff
Current Channel	11
TxRate	1Mbps
Signal Strength	6

This table describes the parameters that can be viewed from the **Link Information** page.

Parameters	Description
State	Refers to the MAC address of the BSS (AP to which the access point client is connected).
Current Channel	The channel that is being presently used for transmission.
Tx Rate	The rate of data transmission in Mbps.
Signal Strength	Given in percentage, showing the intensity of the signal received.

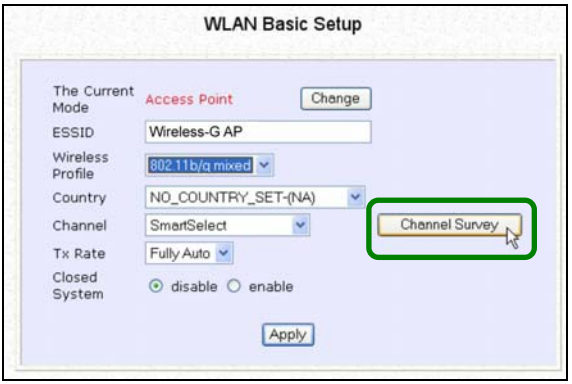
SCAN FOR CHANNEL SURVEY (AVAILABLE FOR ACCESS POINT MODE AND GATEWAY MODE)

Channel Survey provides a list of all channels that are supported by the access point. This feature will show relative interference of all channels and recommend the least congested channel.

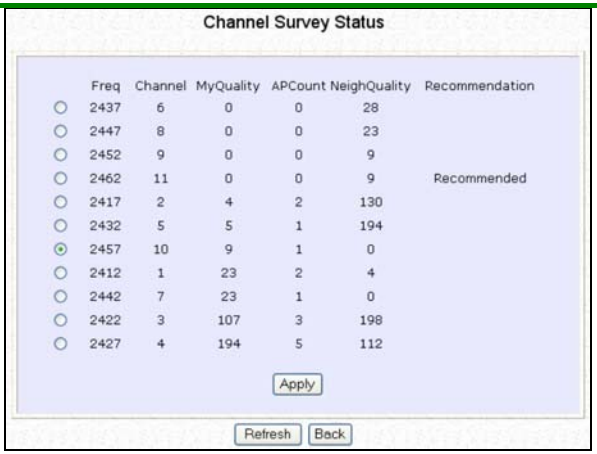
When the users want to scan for and find the best channel, they can use **Channel Survery**.

Step 1:

In the **Mode Setup** page, click on the **Channel Survey** button.



The **Channel Survey** provides a list of the **Freq** (frequency) and **Channel** of the access point detected, the **APCount**, **MyQuality** (your access point's interference from your access point's channel signal) recieved and **NeighQuality** (interference from the neighbouring access points' channel signals) received.



Channel Survey on the 2.4 Ghz frequency band

Please take note that the MYQuality and NeighQuality are RSSI values.

If the value is higher which means that you receive the stronger signal strength from several APs, it indicates that the higher interference from these APS will occur as well. The value of zero indicates no interference.

Step 2:

To connect the access point client to one of the channels detected, select the radio button corresponding to the channel you want to connect to.

Step 3:

Click on the **Apply** button to effect the change and return to the setup page.

Step 4:

Click on the **Refresh** button to update this screen.

This table describes the read-only parameters of all channels that can be viewed from the **Channel Survey** page.

Parameters	Description
Freq	Refers to the frequency of the channel at which your access point is operating.
Channel	Refers to the channel of the access point being used for transmission depending on its origin of country.
MyQuality	Refers to the interference having a RSSI value caused by the current channel at which your access point is operating.
APCount	Refers to the total number of access points operating at the current channel.
NeighQuality	Refers to the interference having a RSSI value caused by the neighbouring channels.
Recommendation	Means that you can recommend the best (preferably least congested) channel.

ANTENNA ALIGNMENT (AVAILABLE FOR ALL MODES)

The **Antenna Alignment** feature in the access point is designed to precisely align the antenna over such a long distance so that the connectivity communication between your access point and another remote or neighbouring access point could be improved as indicated by higher signal strength.

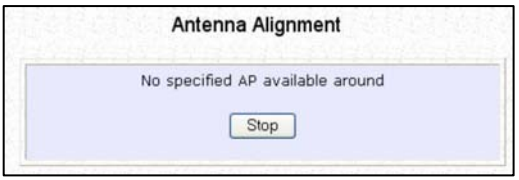
Step 1:

Click on **WLAN Setup** from the **CONFIGURATION** menu. You will see the sub-menus expanded under **WLAN Setup**. Click on **Antenna Alignment**. The **Antenna Alignment** page can act as a diagnostic tool to check the communication with a remote device. The remote AP MAC Address is preset to all zeros by default.

Step 2:

If you wish to specify the MAC address of the remote AP, key in the field next to **Remote AP Address (option)**, followed by executing the **Start** button. Then the pop-up status screen will show up, allowing you to monitor the signal strength received from the remote access points.

If there is no specified AP with its MAC address you have keyed in, the screen below will show on the right. To abort or key in the MAC address of the other available remote AP, click on the **Stop** button.



NOTE
If no MAC address is entered, the **Antenna Alignment** tool will make use of the SSID to align the antenna. Please make sure that the correct SSID is entered. If more than one access point (AP) share the same SSID, the **Antenna Alignment** tool will show the strongest signal AP.

TO CONFIGURE THE SECURITY SETUP OF THE WIRELESS MODE

Kindly refer to Chapter 5 on **WLAN Security** for details on setting the different security modes of the access point.

TO CONFIGURE THE ADVANCED SETUP OF THE WIRELESS MODE

The following will guide you to configure the advanced setup of the wireless mode you have selected.

Step 1:

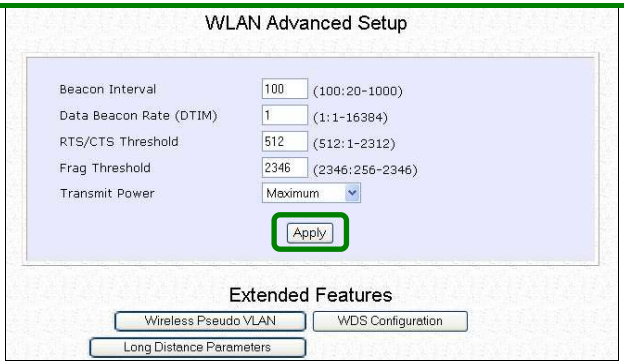
Click on **WLAN Setup** from the **CONFIGURATION** menu to expand into the four sub-menus. From here, click on **Advanced**.

Step 2:

In the **WLAN Advanced Setup** page, enter the parameters.

Step 3:

Click on the **Apply** button to update the changes.



This table describes the parameters that can be modified in the **WLAN Advanced Setup** page.

Parameters	Description
Beacon Interval (Only in Access Point mode)	The **Beacon Interval** is the amount of time between beacon transmissions. A beacon is a guidance signal sent by the access point to announce its presence to other devices in the network. Before a client enters the power-save mode, it needs the *beacon interval* to know when to wake up to receive the beacon (and learn whether there are buffered frames at the access point).
Data Beacon Rate (DTIM) (Only in Access Point mode)	The **Data Beacon Rate (DTIM)** determines how often the beacon contains a delivery traffic indication message (DTIM). The DTIM identifies which clients (in power-save mode) have data frames waiting for them in the access point's buffer. If the beacon period is set at 100 (default value), and the data beacon rate is set at 1 (default value), then the access point sends a beacon containing a DTIM every 100 Kμsecs (1 Kμsec equals 1,024 μsec).
RTS/CTS Threshold	The **RTS/CTS Threshold** value determines the minimum size of a packet in bytes that would trigger the RTS/CTS mechanism.

Frag Threshold	The **Frag Threshold** value indicates the maximum size that a packet can reach without being fragmented. This value extends from 256 to 2346 bytes, where a value of 0 indicates that all the packets should be transmitted using RTS.
Transmit Power	The **Transmit Power** drop-down list lets you pick from a range of transmission power.

For details on how to configure Wireless Pseudo VLAN, WDS and Long Distance Parameters, kindly refer to Chapter 6 on **Wireless Extended Features**.

NOTE
The values illustrated in the examples are suggested values for their respective parameters.

STATISTICS

The following shows you the information on the wireless device that is connected to the WLAN.

IN ACCESS POINT MODE

Step 1:

Click on **WLAN Setup** from the **CONFIGURATION** menu. You will see the sub-menus expanded under **WLAN Setup**. Click on **Statistics**.

Wireless clients that are connected to the WLAN are shown in the WLAN Station List.

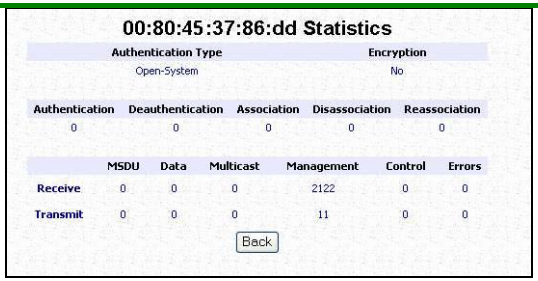
Step 2:

Click on the **Refresh** button to get the latest information on the availability of wireless clients in the wireless network.

Step 3:

To check the details on individual wireless client, click on the MAC Address in the WLAN Station List.

The following screen will show the statistics of the selected wireless client.



00:80:45:37:86:dd Statistics

Authentication Type	Encryption
Open-System	No

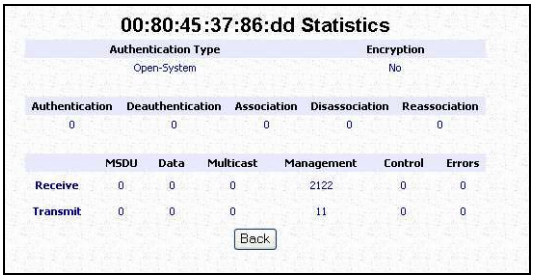
Authentication	Deauthentication	Association	Disassociation	Reassociation
0	0	0	0	0

	MSDU	Data	Multicast	Management	Control	Errors
Receive	0	0	0	2122	0	0
Transmit	0	0	0	11	0	0

Back

IN CLIENT MODE

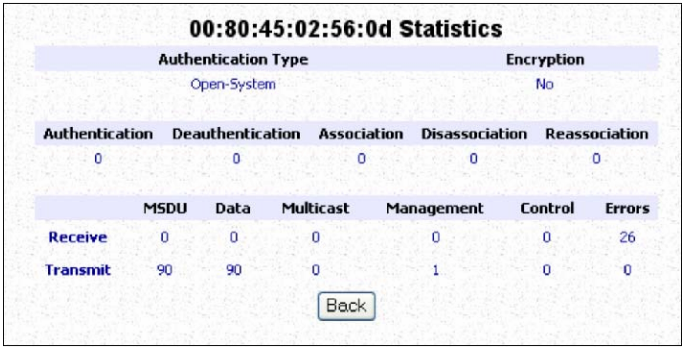
Click on **WLAN Setup** from the **CONFIGURATION** menu. You will see the sub-menus expanded under **WLAN Setup**. Click on **Statistics**.



In **Client** mode, you are not allowed to view other wireless clients' statistics. To view other wireless clients information, you need to change to Access Point mode.

IN POINT TO POINT MODE

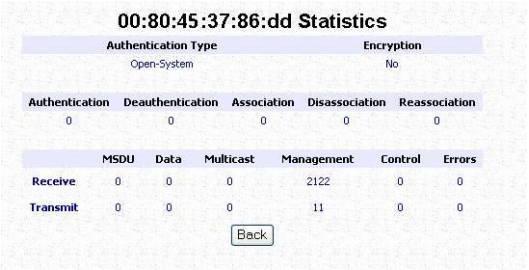
Click on **WLAN Setup** from the **CONFIGURATION** menu. You will see the sub-menus expanded under **WLAN Setup**. Click on **Statistics**.



In **Point to Point** mode, you are not allowed to view other wireless clients' statistics. To view other wireless clients information, you need to change to Access Point mode.

IN POINT TO MULTIPLE POINT MODE

Click on **WLAN Setup** from the **CONFIGURATION** menu. You will see the sub-menus expanded under **WLAN Setup**. Click on **Statistics**.



00:80:45:37:86:dd Statistics

Authentication Type	Encryption
Open-System	No

Authentication	Deauthentication	Association	Disassociation	Reassociation
0	0	0	0	0

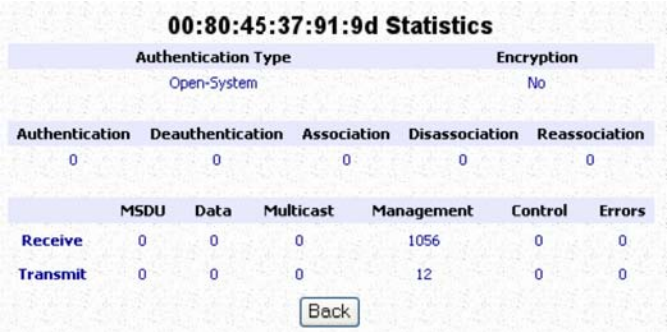
	MSDU	Data	Multicast	Management	Control	Errors
Receive	0	0	0	2122	0	0
Transmit	0	0	0	11	0	0

Back

In **Point to Multiple Point** mode, you are not allowed to view other wireless clients' statistics. To view other wireless clients information, you need to change to Access Point mode.

IN WIRELESS ROUTING CLIENT MODE

Click on **WLAN Setup** from the **CONFIGURATION** menu. You will see the sub-menus expanded under **WLAN Setup**. Click on **Statistics**.



00:80:45:37:91:9d Statistics

Authentication Type	Encryption
Open-System	No

Authentication	Deauthentication	Association	Disassociation	Reassociation
0	0	0	0	0

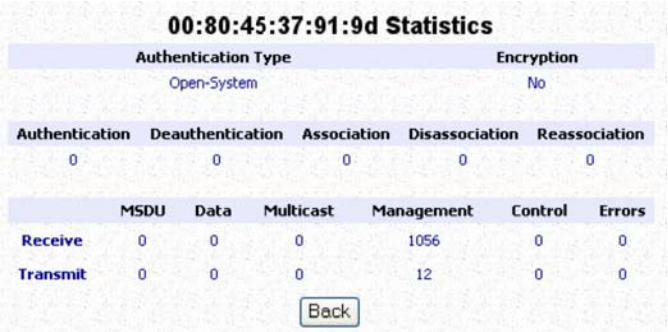
	MSDU	Data	Multicast	Management	Control	Errors
Receive	0	0	0	1056	0	0
Transmit	0	0	0	12	0	0

Back

In **Wireless Routing Client** mode, you are not allowed to view other wireless clients' statistics. To view other wireless clients information, you need to change to Access Point mode.

IN GATEWAY MODE

Click on **WLAN Setup** from the **CONFIGURATION** menu. You will see the sub-menus expanded under **WLAN Setup**. Click on **Statistics**.



00:80:45:37:91:9d Statistics

Authentication Type	Encryption
Open-System	No

Authentication	Deauthentication	Association	Disassociation	Reassociation
0	0	0	0	0

	MSDU	Data	Multicast	Management	Control	Errors
Receive	0	0	0	1056	0	0
Transmit	0	0	0	12	0	0

Back

In **Gateway** mode, you are not allowed to view other wireless clients' statistics. To view other wireless clients information, you need to change to Access Point mode.

WAN SETUP

(ONLY SUPPORTED BY WIRELESS ROUTING CLIENT AND GATEWAY)

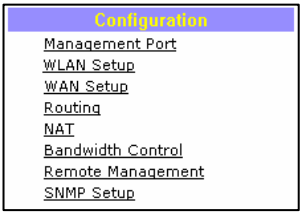
A correct **WAN Setup** allows you to successfully share your Internet connection among the wired and wireless clients of the access point. To do so, you need to identify the type of broadband Internet access you are subscribed to. If you are using :

- ***Cable Internet where your ISP dynamically assigns a WAN IP address*** to you, refer to WAN Setup - Cable Internet with Dynamic IP Assignment.
- ***Cable Internet where your ISP provides you with a fixed WAN IP address*** (or a range of fixed IP addresses), refer to WAN Setup - Cable Internet with Static IP Assignment.
- ***ADSL Internet that requires standard PPP over Ethernet (PPPoE)*** for authentication, refer to WAN Setup - ADSL Internet using PPP over Ethernet (PPPoE).
- ***ADSL Internet that requires standard Point to Point Tunneling Protocol (PPTP)*** for authentication, refer to WAN Setup – ADSL Internet using Point to Point Tunneling Protocol (PPTP).

WAN Setup - Cable Internet with Dynamic IP Assignment

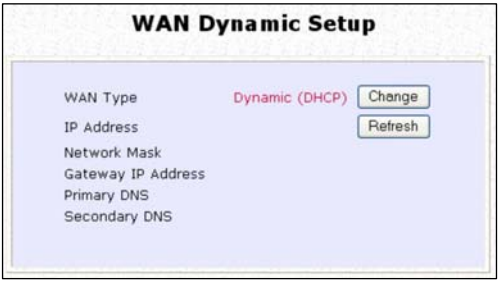
The access point is pre-configured to support a WAN type that dynamically obtains an IP address from the ISP. However, you may verify the WAN settings with the following steps:

Step 1: Under **CONFIGURATION** on the command menu, click on **WAN Setup**.



Step 2:

On the **WAN Dynamic Setup** screen that follows, verify that the **WAN Type** reads **Dynamic (DHCP)** in red colour. Otherwise, click on the **Change** button.



Step 3:

Simply select **Dynamic IP Address** and hit the **Apply** button.

Please remember to click **Reboot System** under **SYSTEM TOOLS** and hit the **Reboot** button to let the settings take effect.

Note: There are exceptional cases where additional configuration is required before an IP address will be allocated by your ISP to the access point.

a. Certain ISPs log the MAC address of the first device used to connect to the broadband channel and will not release a WAN IP address unless the MAC address matches the one in their log. Therefore, if yours is not a new Cable Internet subscription (i.e. your PC was formerly connected directly to your cable modem), refer to **steps 4 - 5** to clone the "approved" MAC address onto the access point.

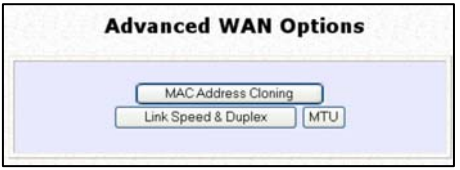
b. Certain ISPs require authentication through a DHCP Client ID before releasing a public IP address to you. The access point uses the System Name in the System Identity as the DHCP Client ID.

Therefore, if this is the case, refer to your ISP for the correct DHCP Client ID to be set and follow **steps 6 - 7** to accomplish the setup.

Step 4:

Steps 4 - 5 are for those who need to clone their Ethernet adapter's MAC address.

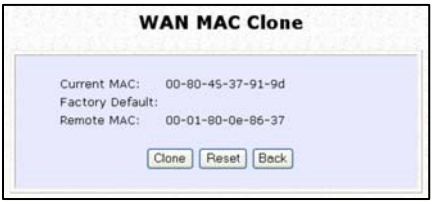
In the **WAN Setup** found under the **CONFIGURATION** command menu, you will see the **Advanced WAN Options**. Click **MAC Clone** to continue.



Step 5:

Simply click on the **Clone** button so that your access point clones the ISP-recognized MAC address of your Ethernet adapter.

Please remember to click **Reboot System** under **SYSTEM TOOLS** and hit the **Reboot** button to let the settings take effect.

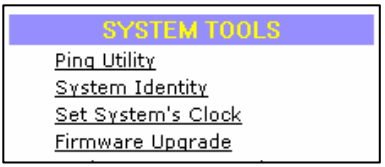


Take note: (If required, you may reset the access point's MAC address to its factory default by clicking **Reset** on that same page)

Step 6:

Steps 6 - 7 are for those who need to set up the **System Name** in **System Identity** so that your ISP can authenticate it as a valid DHCP Client ID.

Click on **System Identity** under the **SYSTEM TOOLS** command menu.



Step 7:

On the following screen, key in the ISP assigned DHCP Client ID as the **System Name** (You may also like to key in a preferred **Systems Contact** person and the **System Location** of the access point). Click the **Apply** button to complete.

Please remember to click **Reboot System** under **SYSTEM TOOLS** and hit the **Reboot** button to let the settings take effect.

WAN Setup - Cable Internet with Static IP Assignment

If you have an ISP that leases a static WAN IP for your subscription, you will need to configure your access point's WAN type accordingly. For example, if the ISP provided you with the following setup information, you can set up your WAN as described below:

IP Address	:	203.120.12.240
Network Mask	:	255.255.255.0
Gateway IP Address	:	203.120.12.2

Step 1:

Under **CONFIGURATION** on the command menu, click on **WAN Setup**.

Step 2:

Access the **Select WAN Type** page and choose **Static IP Address** before clicking the **Apply** button. You will then be brought to the following page requiring your inputs.

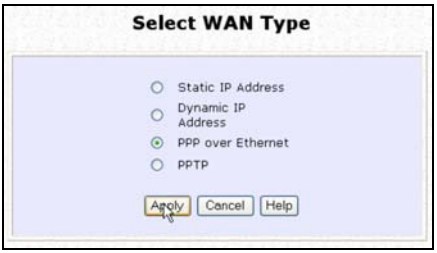
Step 3:

Fill in the information provided by your ISP in the **IP Address**, **Network Mask** and **Gateway IP Address** fields, before clicking the **Apply** button.

Please remember to click **Reboot System** under **SYSTEM TOOLS** and hit the **Reboot** button to let the settings take effect.

WAN Setup - ADSL Internet using PPP over Ethernet (PPPoE)

If you subscribe to an ADSL service using PPP over Ethernet (PPPoE) authentication, you can set up your access point's WAN type as follows. For example, you may configure an account whose username is 'guest' as described below:



Step 1:

Under **CONFIGURATION** on the command menu, click on **WAN Setup**.

Step 2:

Access the **Select WAN Type** page and choose **PPP over Ethernet** before clicking the **Apply** button. You will then be brought to the following page requiring your inputs.

Step 3:

For **Username**, key in your ISP assigned account name (e.g. guest for this example), followed by your account **Password**.

Step 4:

Select **Always-On** if you want your access point to always maintain a connection with the ISP. Otherwise, you may select **On-Demand**. The access point will then connect to the ISP automatically when it receives Internet requests from the PCs in your network.

The **Idle Timeout** setting is associated with the **On-Demand** option, allowing you to specify the value (in seconds) after which the access point will disconnect from the ISP after the last Internet activity. A value of "0" will disable idle timeout. **Reconnect Time Factor** is associated with the **Always-on** option and specifies the maximum time the access point will wait before re-attempting to connect with your ISP. Hit the **Apply** button and **Reboot** the access point.

WAN Setup – ADSL Internet using PPTP

If you subscribe to an ADSL service using Point to Point Tunneling Protocol (PPTP) authentication, you can set up your access point's WAN type from the steps that follow. For example, if the ISP provided you with the following set up information, you can set up your WAN as described below:

IP Address : 203.120.12.47
Network Mask : 255.255.255.0
VPN Server : 203.120.12.15

Step 1:

Under **CONFIGURATION** on the command menu, click on **WAN Setup**.

Step 2:

Access the **Select WAN Type** page and choose **PPTP** before clicking the **Apply** button. You will then be brought to the following page requiring your inputs.

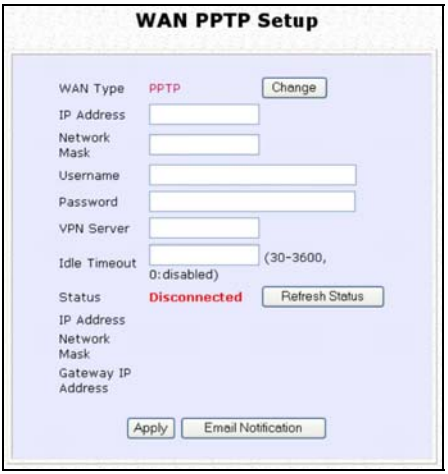
Step 3:

Fill in the information provided by your ISP in the **IP Address, Network Mask** and **VPN Server** fields, followed by clicking the **Apply** button.

Please remember to click **Reboot System** under **SYSTEM TOOLS** and hit the **Reboot** button to let the settings

take effect.

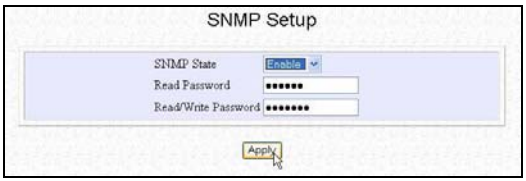
The **Idle Timeout** setting allows you to specify the value (in seconds) after which the access point will disconnect from the ISP after the last Internet activity. A value of "0" will disable idle timeout.



SNMP SETUP

Simple Network Management Protocol (SNMP) is a set of communication protocols that separates the management architecture from the architecture of the hardware devices.

Step 1:
Click on **SNMP** from the **CONFIGURATION** menu.



Step 2:
Select **Enable** from the **SNMP State** drop-down list.

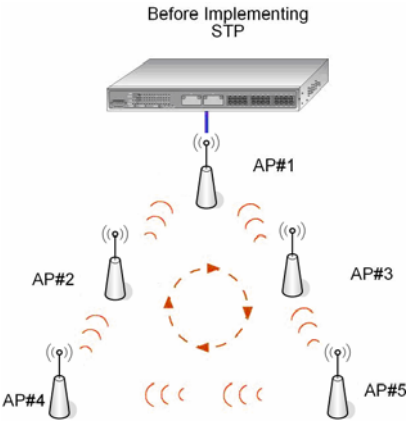
The default **Read Password** is set to *public* while the default **Read/Write Password** is *private*.

Step 3:
Click on the **Apply** button.

STP SETUP

(ONLY AVAILABLE IN ACCESS POINT, POINT TO POINT AND POINT TO MULTIPLE POINT MODES)

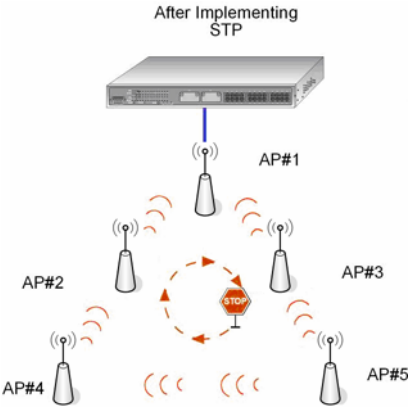
Spanning Tree Protocol (STP) is a link management protocol that helps to prevent undesirable loops occurs in the network. For an Ethernet network to function properly, only one active path can exist between two stations. If a loop exists in the network topology, duplication of messages will occur and this might confuse the forwarding algorithm and allow duplicate frames to be forwarded.



In short, the main purpose of activating STP is to prevent looping when you have redundant paths in the network. Without activating STP, redundant topology will cause broadcast storming.

To establish path redundancy, STP creates a tree that spans all of the devices in an extended network, forcing redundant paths into a standby, or blocked, state, but establishing the redundant links as a backup in case the active link should fail. If STP costs change, or if one network segment in the STP becomes unreachable, the spanning tree algorithm reconfigures the spanning tree topology and re-establishes the connection by activating the standby path. Without spanning tree in place, it is possible that more than one connection may be simultaneously live, which could result in an endless loop of traffic on the LAN.

Spanning-Tree Protocol operation is transparent to end stations, which are unaware whether they are connected to a single LAN segment or a switched LAN of multiple segments.

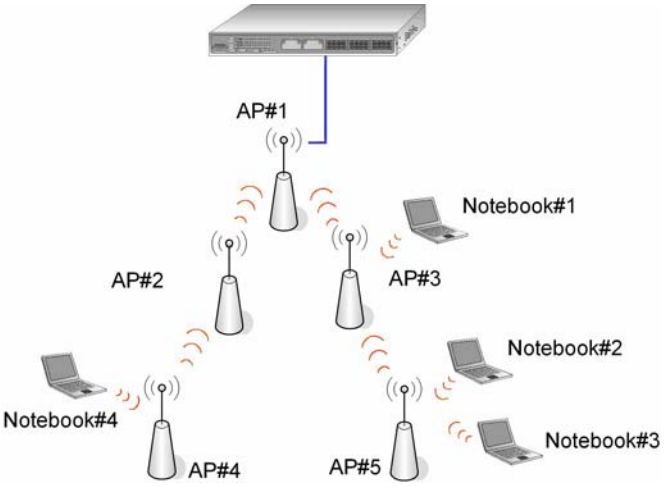


The path with the smallest cost will be used and extra redundant paths will be disabled.

To explain the effect of STP & Pseudo VLAN on the wireless clients, we will compare 3 separate scenarios.

Scenario #1 – (No STP, No Pseudo VLAN)

Referring to the illustration below, if the Spanning Tree Protocol (STP) and Pseudo VLAN are not implemented in a network, all clients (Notebook#1, #2, #3 & #4,) can access to one another, resulting in low level of data security. Due to the redundant paths found in this network, broadcast packets will be duplicated and forwarded endlessly resulting in a broadcast storm.

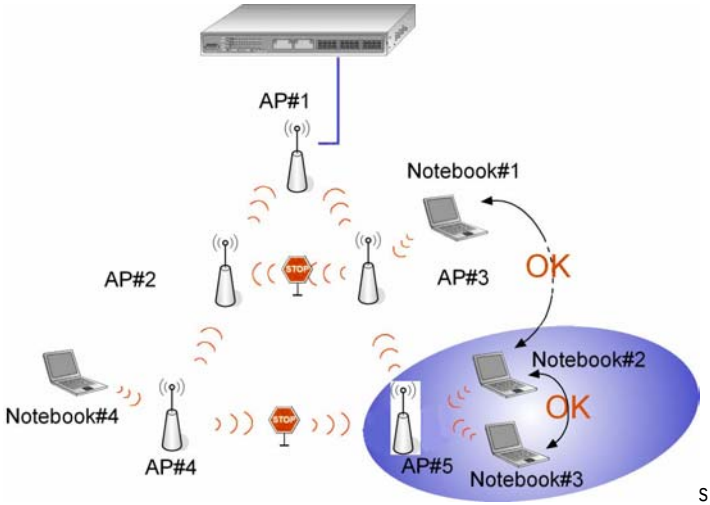


Scenario #2 – (With STP, No Pseudo VLAN)

When STP is enabled, extra redundant network paths between APs will be disabled, hence preventing multiple active network paths in-between any two APs.

If one of the APs is down, the STP algorithm will reactivate one of the redundant paths so that the network connection will not be lost.

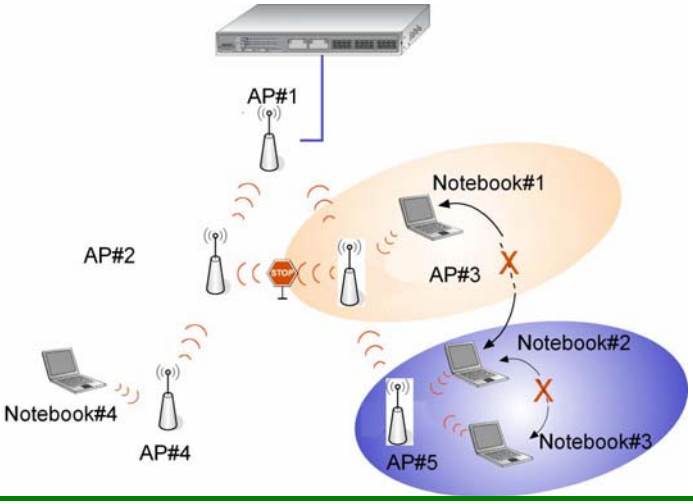
All wireless users will be able to communicate with each other if they are associated to the APs which are in the same WDS zone.



S

Scenario #3 – (With STP and Pseudo VLAN)

In this example, both STP and Pseudo VLAN Per Node are implemented in this network. When Pseudo VLAN Per Node is activated, the wireless users will be unable to access one another.



Step 1:

Click on **STP Setup** from the **CONFIGURATION** menu

Step 2:

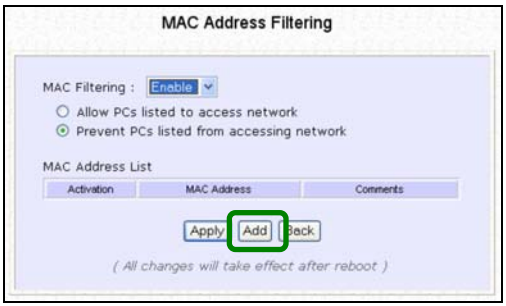
Select **Enable** from the **STP State** radio button and click on the **Apply** button to update the changes.

MAC FILTERING

MAC Filtering acts as a security measure by controlling the users accessing to the network through their MAC address. You can either keep a list of MAC address corresponding to users who are allowed to access the network or to keep a list of MAC address corresponding to users who are forbidden from network access.

Step 1:

Click on **MAC Filtering** from the **CONFIGURATION** menu. **Enable** the function of MAC Filtering.



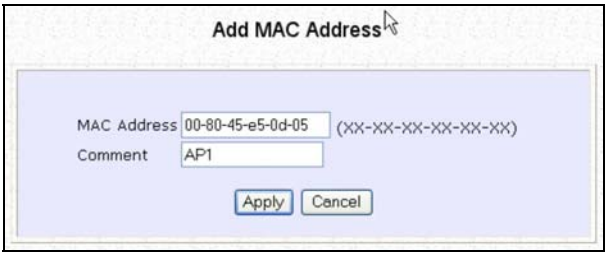
Step 2:

Click on the **Add** button to create a client in the MAC Address List.

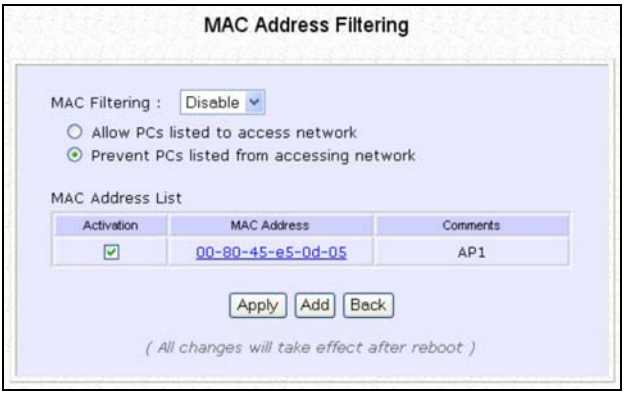
Step 3:

In the **Mac Address** field, enter the wireless MAC address of the client, in the format **xx-xx-xx-xx-xx-xx**, where x can take any value in the range 0-9 or a-f. After that, you can enter the text in the **Comment** field to describe the **MAC Address** you just added.

Click on the **Apply** button.



Notice that the MAC Address has been added to the list.



Step 4:

Next, you can choose whether you wish to allow or to prevent network access for the users in the MAC address list. Simply click on the radio button besides **Allow PCs listed to access network**, or **Prevent PCs listed from accessing network**, respectively.

Step 5:

Click on the **Apply** button to update the changes.

NOTE

When Mac Filtering is enabled with the **Allow PCs listed to access network** policy, the Mac Address list cannot be empty.

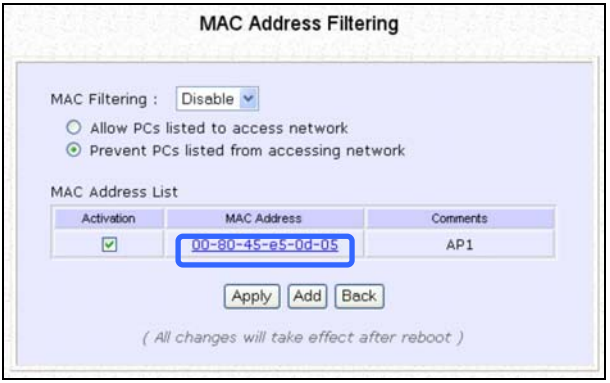
ADD ANOTHER MAC ADDRESS TO THE MAC ADDRESS LIST

Follow the procedures mentioned in Step 2 to Step 3.

EDIT/DELETE A MAC ADDRESS FROM THE MAC ADDRESS LIST

Step 1:

Click on the **MAC address** in the table as shown below.

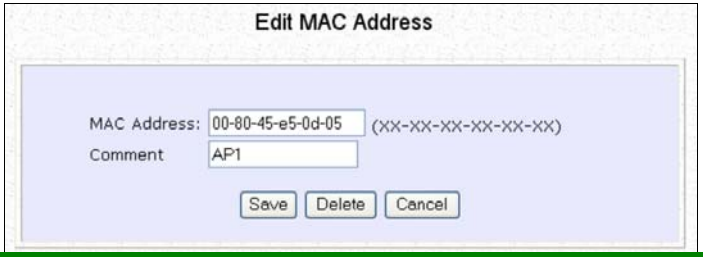


Notice that there is a column labeled **Activation** in the MAC Address List. When a tick is present, this shows that action will be taken (either to allow or prevent network access) for the PC holding the corresponding MAC address.

Step 2:

From the **Edit MAC Address** page,

Click on the **Delete** button to remove the MAC address, or
Click on the **Save** button after you have edited the entry.



Chapter 5: WLAN Security

This section illustrates how to make your WLAN more secure. All the nodes in your network MUST share the same wireless settings to be able to communicate.

We will illustrate how to configure each type of security mode individually.

To start with, follow the common preliminary steps described below to select the most appropriate security approach for protecting your wireless communications.

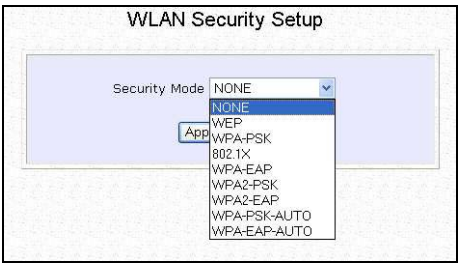
Step 1:

Click on **WLAN Setup** from the **CONFIGURATION** menu to select **Security**.

Step 2:

Make a selection from the **Security Mode** drop down menu. The **Security Mode** is set to **NONE** by default.

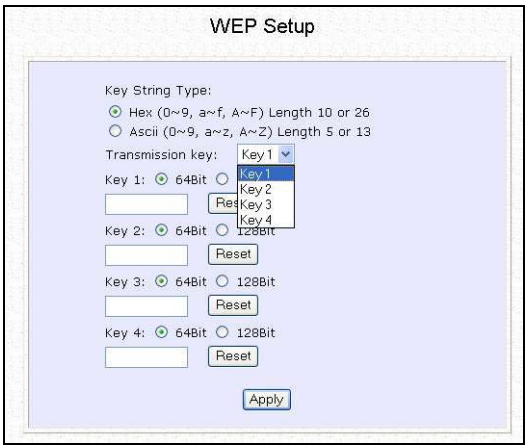
Click on the **Apply** button.



HOW TO SET UP WEP

The guidelines below will help you to set up your access point for using WEP.

At the **WEP Setup** page,



Step 1:

Specify the **key entry type**, by selecting either:

- **Use Hexadecimal:**
- **Use ASCII**

Step 2:

Select the **Transmission Key** from the pull down menu:

- **Key 1**
- **Key 2**
- **Key 3**
- **Key 4**

The access point lets you define up to four different transmission keys. It defines a set of shared keys for network security. You must enter at least one WEP key to enable security using a shared key.

Step 3:

Select the **length** of each encryption key:

- **64- bit WEP**
  10 hexadecimal or 5 ASCII Text
- **128-bit WEP**
  26 hexadecimal or 13 ASCII Text

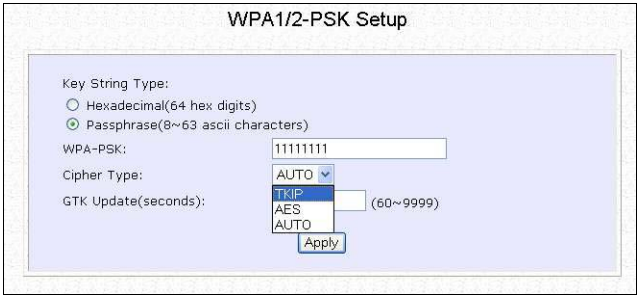
To clear the values that you had entered in the field, click on the **Reset** button.

Click on the **Apply** button and reboot your access point.

HOW TO SET UP WPA-PSK/WPA2-PSK/WPA-PSK-AUTO (Only available in Access Point mode)

The guidelines below will help you to set up the access point for using WPA-PSK. Please follow the steps below if you have activated **WPA-PSK**, **WPA2-PSK** or **WPA-PSK-AUTO** security modes.

At the **WPA1/2-PSK Setup** page,



Step 1:

Specify the **key entry type**, by selecting either:

- **Passphrase (Alphanumeric characters)**
- **Hexadecimal**

Step 2:

Fill in the **WPA-PSK** (Pre-Shared network Key):
If you are using the **Passphrase** format, your entry can consist of a minimum of 8 alphanumeric characters or a maximum of 63 alphanumeric characters.

Otherwise, when using the **Hexadecimal** format, your entry MUST consist of 64 hexadecimal characters.

Step 3:

For WPA-PSK
Set the **Cipher Type** to **TKIP**.
WPA replaces WEP with a strong encryption technology called Temporal Key Integrity Protocol (TKIP) with Message Integrity Check (MIC).

For WPA2-PSK
Set the **Cipher Type** to **AES**.
Advanced **E**ncryption **S**tandard (AES) is a stronger symmetric 128-bit block data encryption technique. AES is a requirement of WPA2 under the IEEE 802.11i standard.

For WPA-PSK-AUTO
Set the **Cipher Type** to **Auto** to allow the access point to automatically detect the cipher type to use.

Step 4:

Enter the **GTK (Group Transient Key) Updates**.
This is the length of time after which the access point will automatically generate a new shared key to secure multicast/broadcast traffic among all stations that are communicating with it. By default, the value is 600 seconds.

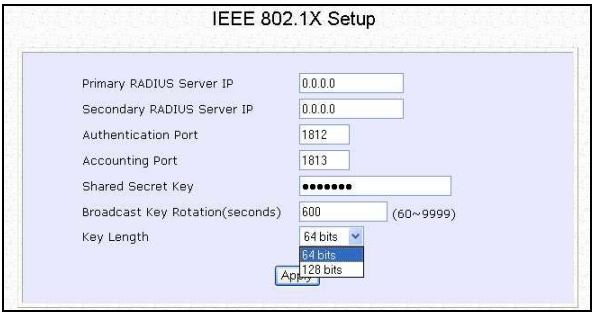
Step 5:

Press the **Apply** button and reboot your system, after which your settings will become effective.

HOW TO SET UP 802.1X/RADIUS (ONLY AVAILABLE IN ACCESS POINT MODE)

The guidelines below will help you to set up the access point for using 802.1x/RADIUS.

At the IEEE 802.1x Setup page,



Step 1:

Key in the IP address of the **Primary RADIUS Server** in your WLAN. You can optionally add in the IP address of a **Secondary RADIUS Server**, if any.

The RADIUS authentication server MUST be in the same subnet as the access point.

Step 2:

By default, the value for **Authentication Port** number is **1812**. You can leave this value as it is. This value must be set to be the same as the one in the RADIUS server.

Step 3:

By default, the value for **Accounting Port** number is **1813**. You can leave this value as it is. This value must be set to be the same as the one in the RADIUS server.

Step 4:

Enter the **Shared Secret Key** in the field provided.

Step 5:

By default, the **Broadcast Key Rotation** is set as **600** seconds. You may leave this value as its default setting.

Step 6:

Select the **length** of each encryption key:

- **64- bit**
  10 hexadecimal or 5 ASCII Text
- **128-bit**
  26 hexadecimal or 13 ASCII Text

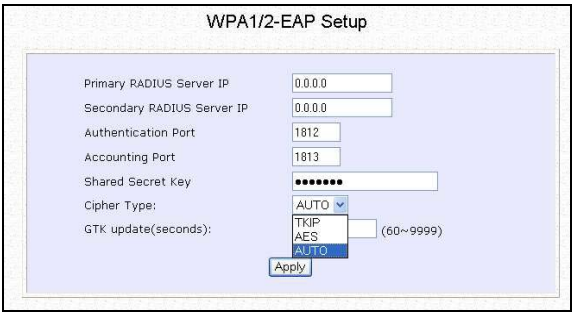
Step 7:

Press the **Apply** button and reboot your system, after which your settings will become effective.

How to set up WPA EAP/WPA2-EAP/WPA-EAP-AUTO (Only Access Point mode supports WPA2-EAP and WPA-EAP-AUTO)

The guidelines below will help you to set up the access point for using WPA-EAP. Please follow the steps below if you have selected the WPA or WPA1-EAP, WPA2-EAP or WPA-EAP-AUTO.

At the **WPA1/2-EAP Setup** page,



Step 1:

Key in the IP address of the **Primary RADIUS Server** in your WLAN.

You can optionally add in the IP address of a **Secondary RADIUS Server**, if any. The RADIUS authentication server MUST be in the same subnet as the access point.

Step 2:

By default, the value for **Authentication Port** number is **1812**. You can either leave this value as it is or key in a different Authentication Port but it MUST match the corresponding port of the RADIUS server.

Step 3:

By default, the value for **Accounting Port** is **1813**. You can leave this value as it is. This value must be set to be the same as the one in the RADIUS server.

Step 4:

Enter the **Shared Secret Key** used to validate client-server RADIUS communications.

Step 5:

Select the **length** of each encryption key:

- **64- bit**
  10 hexadecimal or 5 ASCII Text
- **128-bit**
  26 hexadecimal or 13 ASCII Text

Step 6:

For WPA-EAP
Set the **Cipher Type** to **TKIP**.
WPA replaces WEP with a strong encryption technology called Temporal Key Integrity Protocol (TKIP) with Message Integrity Check (MIC).

For WPA2-EAP (Only in Access Point mode)
Set the **Cipher Type** to **AES**.
Advanced **E**ncryption **S**tandard (AES) is a symmetric 128-bit block data encryption technique. It is a requirement of WPA2 under the IEEE 802.11i standard.

For WPA-EAP-AUTO (Only in Access Point mode)
Set the **Cipher Type** to **Auto** to allow the access point to automatically detect the cipher type to use.

Step 7:

Enter the **GTK (Group Transient Key) Updates**.
This is the length of time after which the access point will automatically generate a new shared key to secure multicast/broadcast traffic among all stations that are communicating with it. By default, the value is 600 seconds.

Step 8:

Press the **Apply** button and reboot your system, after which your settings will become effective.

Chapter 6: Wireless Extended Features

This section illustrates how to configure the wireless extended features. To start with, follow the common preliminary steps described below.

ACCESS CONTROL – THE WIRELESS PSEUDO VLAN (ONLY IN ACCESS POINT MODE)

A **VLAN** is a group of PCs or other network resources that behave as if they were connected to a single network segment although they may be physically located on different segments of a LAN.

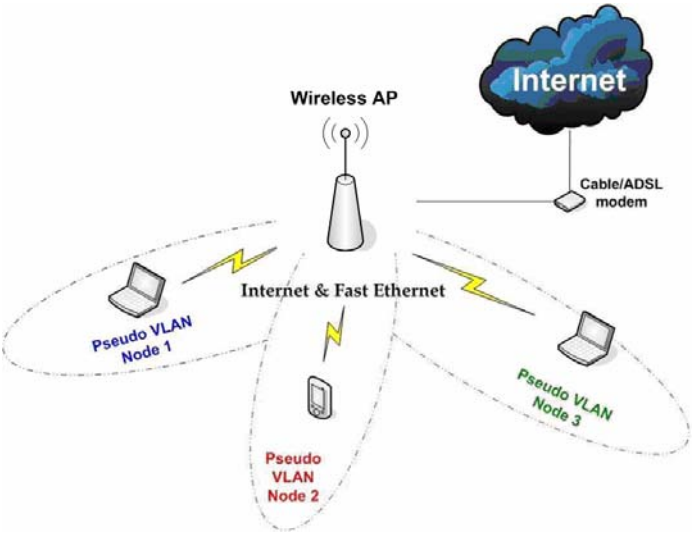
Those stations which are assigned to the same VLAN share network resources and bandwidth as if they were connected to the same segment. Conversely, only the stations within the same VLAN can access each other.

A **Wireless Pseudo VLAN** acts by segregating a single wireless LAN into multiple VLANs so that communication is possible only among wireless clients within the same VLAN.

When operating in the **Access Point** mode, Access point allows you to define *Wireless Pseudo VLAN Per Node* and *Wireless Pseudo VLAN Per Group*.

WIRELESS PSEUDO VLAN PER NODE

When implemented, this mode isolates each wireless client into its own pseudo VLAN. Wireless clients can therefore access resources on the wired network but are unable to see each other or access each other's data.



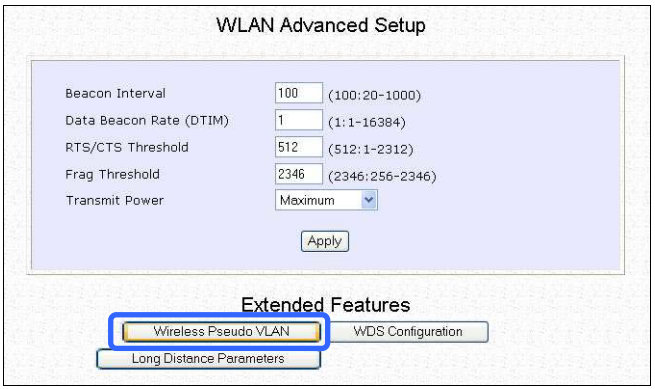
The following steps demonstrate how to set up a Wireless Pseudo VLAN per Node.

Step 1:

From **WLAN Setup** under Configuration, click on **Advanced**, which shows the **WLAN Advanced Setup** page.

Step 2:

Go to the **Extended Features** section, and click on the **Wireless Pseudo VLAN** button.

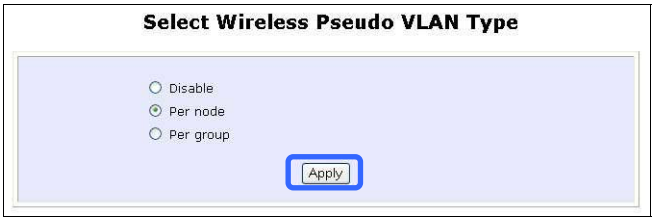


Step 3:

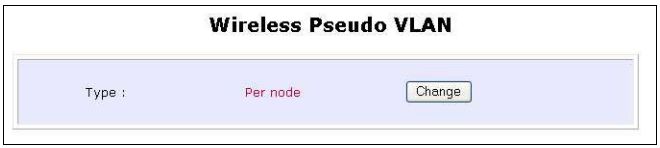
The **Wireless Pseudo VLAN** function is disabled by default. Click on the **Change** button to make your selection of the type of Pseudo VLAN to implement.

Step 4:

Select the **Per node** radio button and click on the **Apply** button.

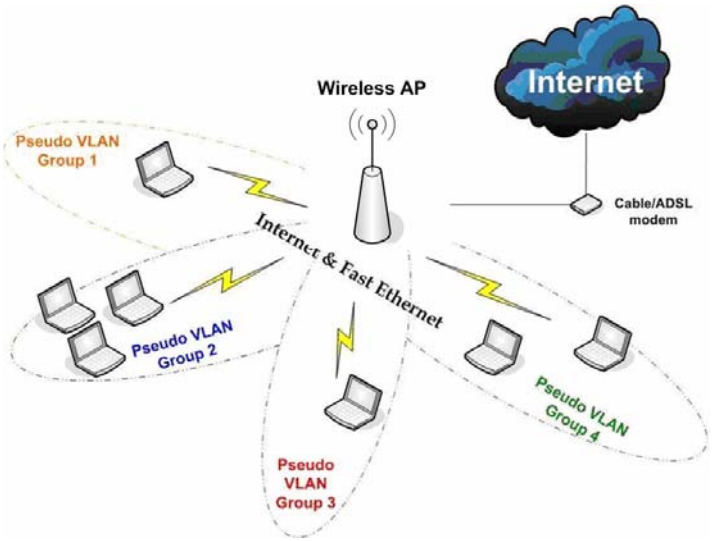


The Wireless Pseudo VLAN has configured as Per node.



WIRELESS PSEUDO VLAN PER GROUP

The access point can configure up to 32 'groups' of wireless clients identified by their MAC address. Whenever a wireless client requests network access, the access point will first verify whether its MAC address is present in any of the Pseudo VLAN groups. If it is, the access point will grant it access to the wired system resources and to all other wireless clients belonging to the same Pseudo VLAN group only.

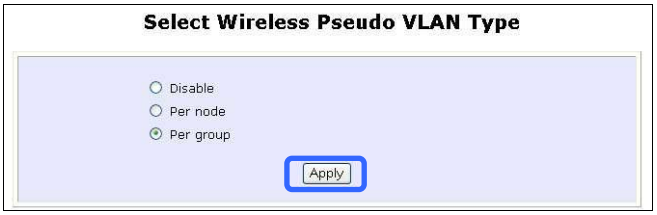


The following steps demonstrate how to set up Wireless Pseudo VLAN Groups.

CREATE A CLIENT IN A PSEUDO VLAN GROUP

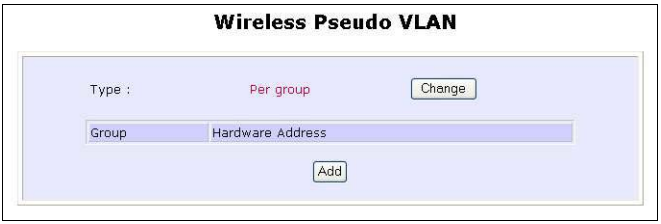
Step 1:

From the **Select Wireless Pseudo VLAN Type** page, select **Per group** and click on the **Apply** button.



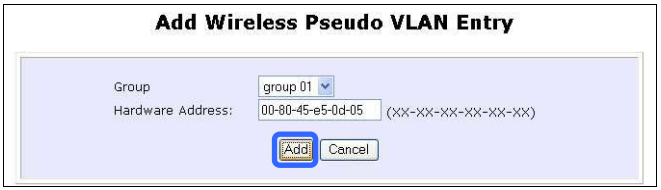
Step 2:

Click on the **Add** button to create a client in the Wireless Pseudo VLAN group.



Step 3:

Select a group number from the **Group** drop-down list.



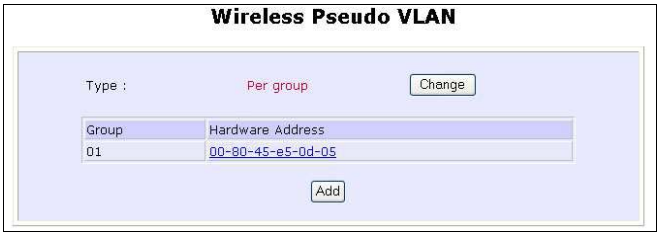
Step 4:

Fill in the **Hardware Address** field with the MAC address of the client in the format **xx-xx-xx-xx-xx-xx**, where x is any value within the range 0-9 or a-f.

Step 5:

Click on the **Add** button to update the changes.

The Pseudo VLAN group has been added to the list as shown below.



NOTE

A client can be a member of more than one Pseudo VLAN group. For instance, if a client is a member of wireless Pseudo VLAN groups 01 and 02, it will be able to communicate with the other clients in both groups.

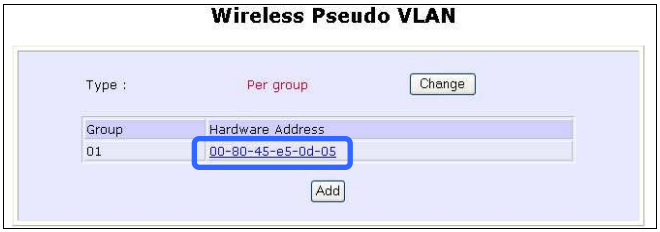
ADD ANOTHER CLIENT IN A PSEUDO VLAN GROUP

Follow the procedures mentioned in Steps 3-5. You can create up to 32 members per Wireless Pseudo VLAN group.

EDIT/DELETE A CLIENT IN A PSEUDO VLAN GROUP

Step 1:

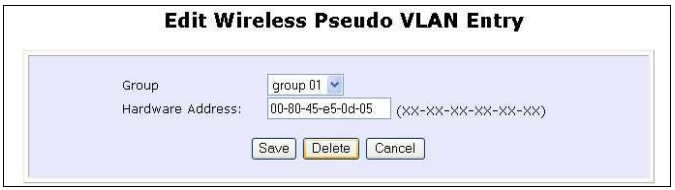
Click on the **MAC address** in the table as shown below.



Step 2:

From the **Edit Wireless Pseudo VLAN Entry** page,

Click on the **Delete** button to remove the client from the group, or
Click on the **Save** button after you had edited the entry.



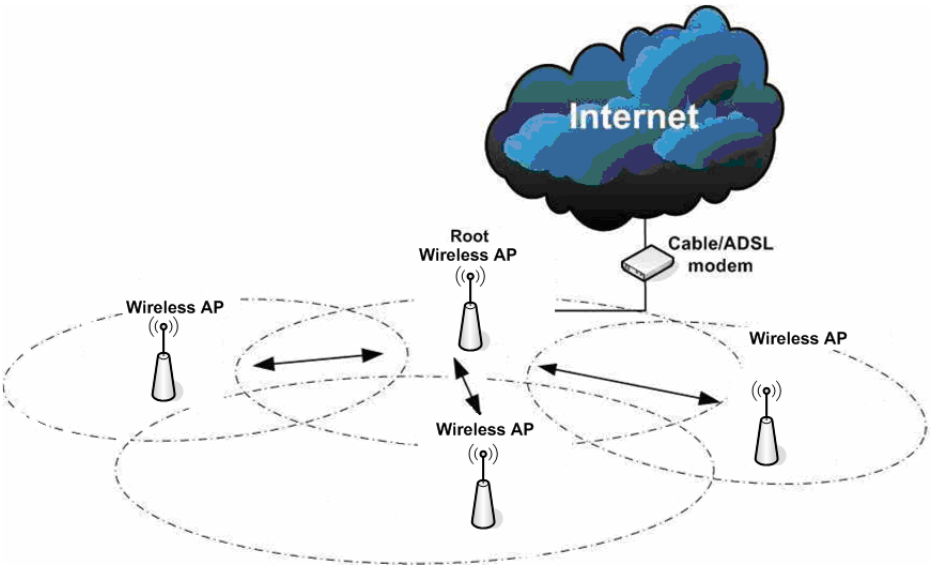
WIRELESS SETUP - THE WIRELESS DISTRIBUTED SYSTEM (WDS)
(Only in Access Point mode)

A wireless distribution system links up several access points, creating a wider network in which mobile users can roam while still staying connected to the available network resources.

In a WDS, the access point can drive a cell of wired and wireless clients while at the same time, connecting to other access points. This requires the operational frequency channel to be the same within the cell controlled by your access point as well as for its wireless links to the other access points.

Star Configuration WDS

In a star configuration WDS, links are established between one root Access point and several satellite wireless APs positioned to increase the area covered.

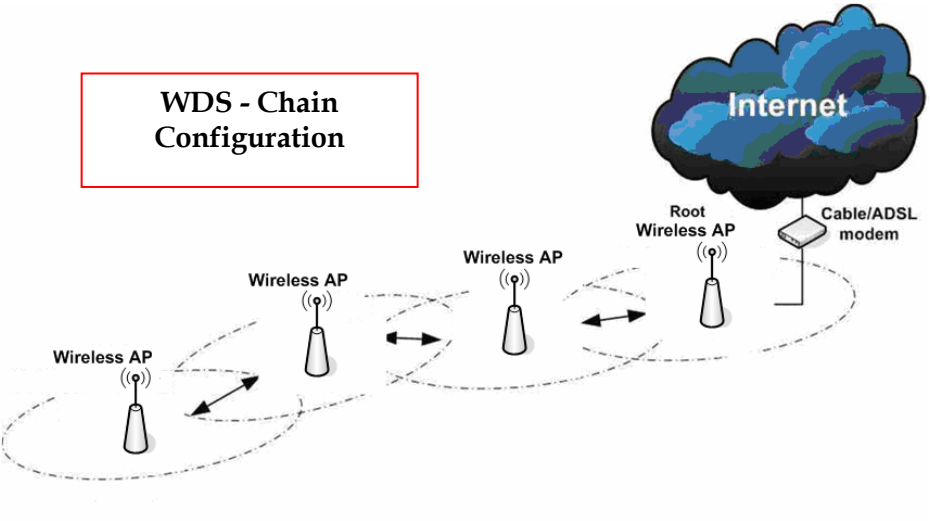


Here, the root Wireless AP connects to the wired network and maintains three WDS links while each satellite Wireless AP (Access Point) maintain a WDS link for communication with the root.

Chain Configuration WDS

A chain configuration WDS spans an area in length, for instance a long corridor. Satellite access points are chained together starting from a root access point.

The access point at either end of the chain will have only one WDS link enabled, while the access points in the middle will have two WDS links configured to associate with the neighboring Access point upward and downward in the chain.



The following steps will guide you in setting up WDS in your access point.

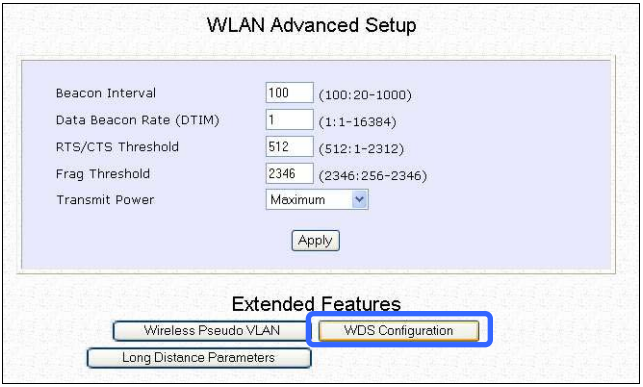
CREATE A CLIENT IN A WDS

Step 1:

From **WLAN Setup** under Configuration, click on **Advanced**, which shows the **WLAN Advanced Setup** page.

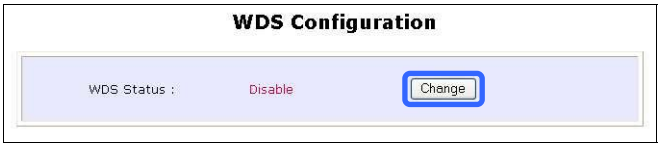
Step 2:

Go to the **Extended Features** section, and click on the **WDS Configuration** button.



Step 3:

As illustrated on the **WDS Setup**, the **WDS** feature is disabled by default. Click on the **Change** button.

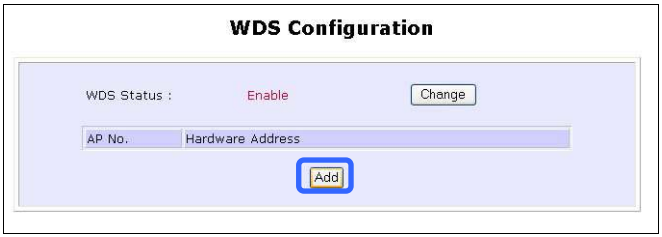


Step 4:

From the **Enable/Disable WDS** page, select **Enable** and click on the **Apply** button.

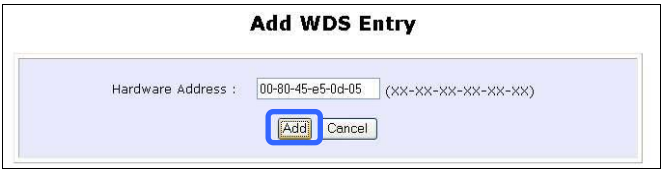
Step 5:

Click on the **Add** button to create a MAC address of a client.



Step 6:

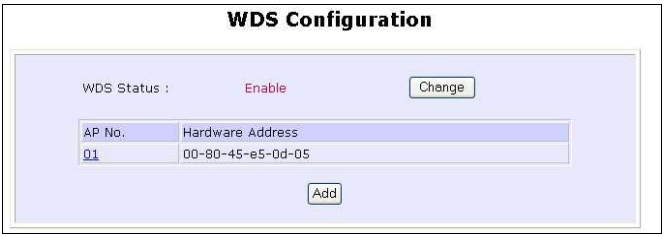
Fill up the **Hardware Address** field with the wireless MAC address of the device to include in your WDS, using the format xx-xx-xx-xx-xx-xx, where x can take any hexadecimal value 0-9 or a-f.



Click on the **Add** button to update the table.

Step 7:

From the **WDS Configuration** page, notice that the MAC Address has been added to the table as shown below.



NOTE

To configure WDS, all your access points must use the same channel and security mode and both access points at opposite ends of a WDS link must have each other's wireless MAC address

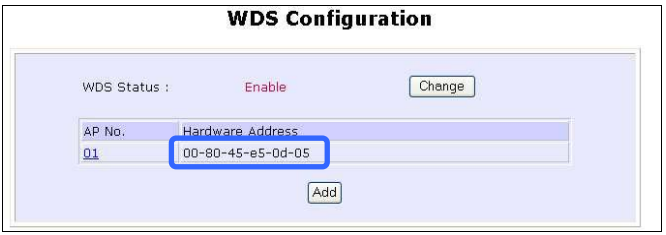
ADD ANOTHER CLIENT IN A PSEUDO VLAN GROUP

Follow the procedures mentioned in Step 5 to Step 7.

EDIT/DELETE A CLIENT IN A WDS

Step 1:

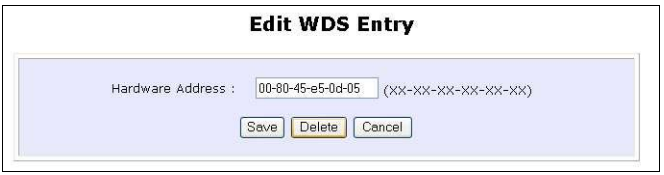
Click on the **MAC address** in the table as shown below.



Step 2:

From the **Edit WDS Entry** page,

Click on the **Delete** button to remove the client from the WDS, or
Click on the **Save** button after you have edited the entry.



LONG DISTANCE PARAMETERS

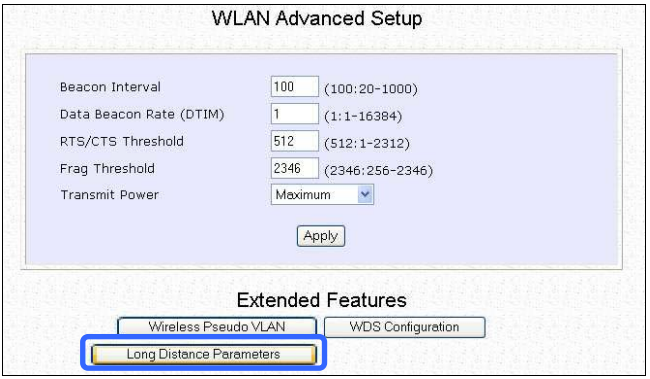
This setup allows the access point to calculate and display suggested values for certain parameters to use to ensure that wireless communication takes place efficiently and effortlessly between physically distant APs. The following steps demonstrate how to configure the Long Distance Parameters.

Step 1:

From **WLAN Setup** under Configuration, click on **Advanced**, which shows the **WLAN Advanced Setup** page.

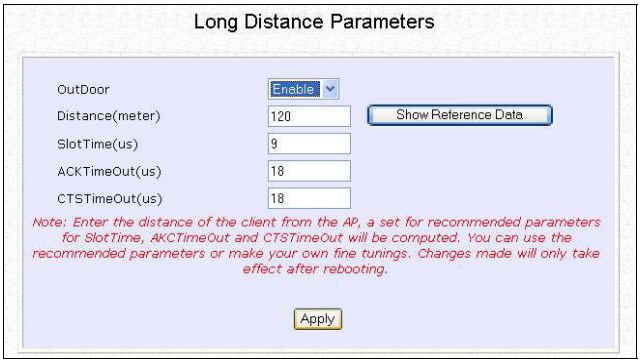
Step 2:

Go to the **Extended Features** section, and click on the **Long Distance Parameters** button.



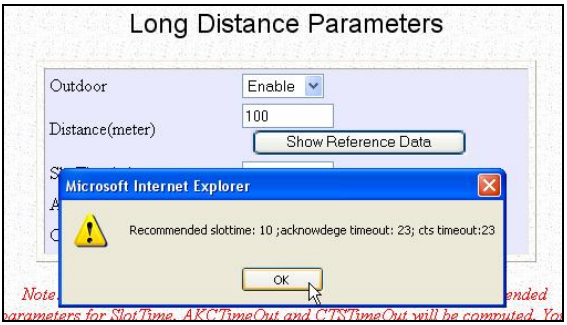
Step 3:

As illustrated on the **Long Distance Parameters** Setup page, the **Outdoor** feature is disabled by default. Select **Enable** from the pull down menu.



Step 4:

The access point can automatically calculate the values of the parameters to input based on the distance between your access point and the other wireless device. Enter the distance in meters and click on **Show Reference Data**.



Step 5:

You can enter the parameters according to the recommended values in the pop-up window, click on the **Apply** button to update the changes.

This table describes the parameters that can be modified in the **Long Distance Parameters** page.

Parameters	Description
Outdoor	The Outdoor parameter is disabled by default. If set to Enable, the Outdoor parameters will be configured for outdoor communication over short or long distances as specified.
Distance	This parameter determines the distance between your access point and the remote access point. It should be entered in meters.
Slot Time	Time is slotted and each unit of time is called one slot time.
ACK Timeout	This parameter determines the timeout allowed for the sending client to receive the acknowledgment response from the receiving client. If no acknowledgment packet is received within this period, the sender will assume the receiver has not received the packet and will attempt to re-send.
CTS Timeout	This Clear-to-Send time is the time the wireless sender will wait for a CTS packet signaling that the channel is idle and it can start data transmission. If no CTS packet is received within this period, the sender will assume the channel is busy and will wait before trying to send again.

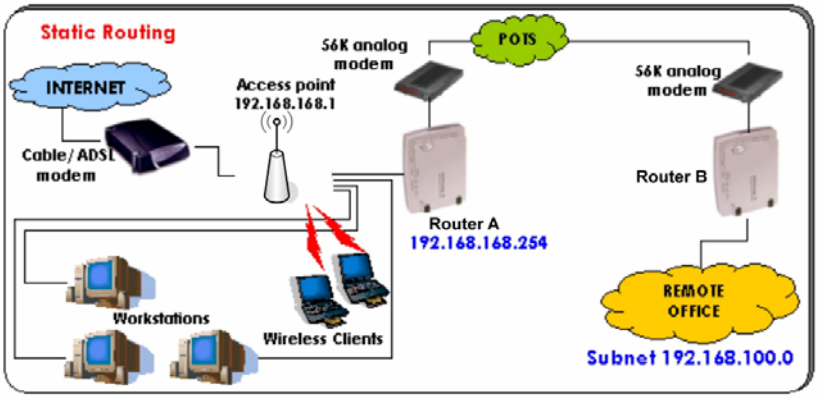
Chapter 7: Advanced Configuration

ROUTING (ONLY SUPPORTED BY WIRELESS ROUTING CLIENT AND GATEWAY)

The access point allows the network administrator to add a static routing entry into its routing table so that the access point can re-route IP packets to another network access point. This feature is very useful for a network with more than one access point.

Important:
You do NOT need to set any routing information if you are simply configuring the access point for broadband Internet sharing. Improper routing configuration will cause undesired effect.

The diagram below illustrates a case in which you have two routers in the network. Router A is used for broadband Internet sharing while Router B connects to a remote office. You may then define a static routing entry in the access point to re-route the packets to the remote office.



In this network, the main office of subnet 192.168.168.0 contains two routers: the

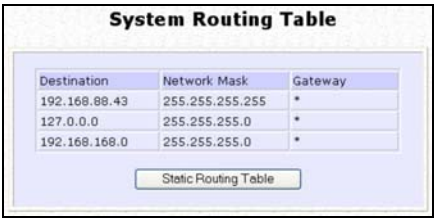
office is connected to the Internet via the access point (192.168.168.1) and to the remote office via Router A (192.168.168.254). The remote office resides on a subnet 192.168.100.0.

You may add a static routing entry into the access point's routing tables so that IP packets from the clients in the main office with a destination IP address of 192.168.100.X (where X is any number from 2 to 254) will be routed to Router B, which acts as the gateway to that subnet.

TO CONFIGURE STATIC ROUTING OF THE ACCESS POINT

With an understanding of how adding a static routing entry can facilitate a network setup such as the one described above, here is how you may configure the access point:

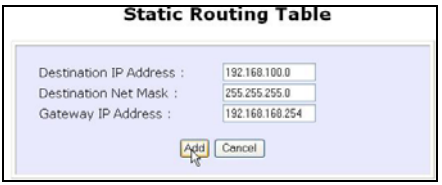
Step 1:
Under the **CONFIGURATION** command menu, click on **Routing** to be brought to the **System Routing Table** shown (on the right). Initially, the table will contain the default routing entries built into Access point.



Step 2:
Click on the **Static Routing Table** button above.

On this page, click the **Add** button.

Step 3:
You may specify the **Destination IP Address**, **Destination Net Mask** and **Gateway IP Address** here. For this example, they are 192.168.100.0, 255.255.255.0 and 192.168.168.254 respectively. Hit the **Add** button to finish.



When the entry is added, it is

reflected in the **Static Routing Table**.

NAT (ONLY SUPPORTED BY WIRELESS ROUTING CLIENT AND GATEWAY)

The basic purpose of NAT is to share a single public IP address when there are multiple PCs in the private network by using different TCP ports to identify requests coming from different PCs. NAT is enabled by default.

Due to NAT, computers in the private LAN behind the access point will not be directly accessible from the Internet. However, employing virtual Servers lets you host Internet servers behind the NAT by way of IP/Port Forwarding as well as De-Militarized Zone hosting.

To learn more about NAT and its complementary technologies, please turn to the NAT Technology Primer found on the Product CD.

Step 1:
Under the **CONFIGURATION** command menu, click on **NAT**. NAT is enabled by default. To disable it, click **Disable**.

Step 2:
Click **Apply** to effect the setting.

Important:
Do NOT disable NAT unless absolutely necessary. Disabling NAT will disable broadband Internet sharing effectively.

TO CONFIGURE VIRTUAL SERVERS BASED ON DE-MILITARIZED ZONE (DMZ) HOST

Having gone through the NAT Technology Primer on the Product CD, you would now have a good understanding of how DMZ works to make a specific PC in an NAT-enabled network directly accessible from the Internet.

When NAT is enabled, an Internet request from a client within the private network first goes to the access point receiving a request, the access point keeps track of which client is using which port number. Since any reply from Internet goes to the access point first, the access point (from the port number in the reply packet) knows to which client to forward the reply. If the access point does not recognize the port number, it will discard the reply.

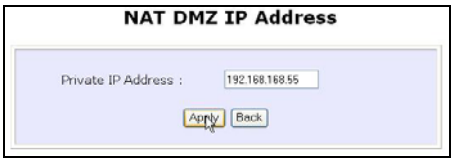
When using DMZ on a PC, any reply not recognized by the access point will be forwarded to the DMZ-enabled PC instead.

Step 1:
Under the **CONFIGURATION** command menu, click on **NAT**. You will find the **Advanced NAT Options** available near the bottom of the page.

Step 2:
Click the **DMZ** button to configure Virtual Servers based on De-Militarized Zone host.

Step 3:

On the **NAT DMZ IP Address** page, you have to define the **Private IP Address** of the DMZ host. In this example, we keyed in the private IP address for the PC we wish to place within the DMZ : 192.168.168.55



(Enter **0.0.0.0** as the **Private IP Address** and it will disable DMZ).

Remember to click the **Apply** button.

NOTE

1. When you enable DMZ, the Static IP Address configuration is recommended for the DMZ host. Otherwise, if the address is allocated by DHCP, it may change and DMZ will not function properly.

2. DMZ allows the host to expose ALL of its parts to the Internet. The DMZ host is thus susceptible to malicious attacks from the Internet.

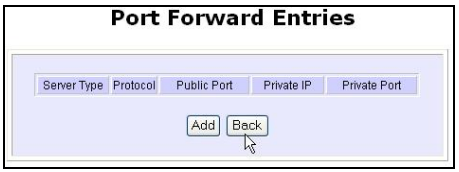
TO CONFIGURE VIRTUAL SERVERS BASED ON PORT FORWARDING

Virtual Server based on Port Forwarding is implemented to forward Internet requests arriving at the access point's WAN interface, based on their TCP ports, to specific PCs in the private network. If you require more information on this function, please refer to the NAT Technology Primer on the Product CD.

Step 1:
Under the **CONFIGURATION** command menu, click on **NAT**. You will find the **Advanced NAT Options** available near the bottom of the page.

Step 2:
Click the **Port Forwarding** button to configure Virtual Servers based on Port Forwarding.

Step 3:
Hit the **Add** button on the **Port Forward Entries** page.



Step 4:

On the following **Add Port Forward Entry** screen, you can set up a Virtual Server for a **Known Server** type by selecting from a drop-down menu OR you can define a **Custom Server**.

For a more detailed explanation, please refer to the NAT Technology Primer found on the Product CD.

Known Server

Server Type : Select from the drop-down list of known server types: (HTTP, FTP, POP3 or Netmeeting).

Private IP Address : Specify the LAN IP address of your server PC running within the private network.

Custom Server

Server Type : Define a name for the server type you wish to configure.

Protocol : Select either **TCP** or **UDP** protocol type from the dropdown list.

Public Port : Select whether to define a single port or a range of public port numbers to accept.

From : Starting public port number

To : Ending public port number. If the Public Port type is Single, this field will be ignored.

Private IP Address : Specify the IP address of your server PC running within the private network.

Private Port From : Starting private port number. The ending private port number will be calculated automatically according to the public port range.

As an example, if you want to set up a web server on a PC with IP address of 192.168.168.55, select HTTP as **Server Type** and enter **192.168.168.55** as the **Private IP Address**. Click on the **Add** button. You will see the entry reflected as on the right.

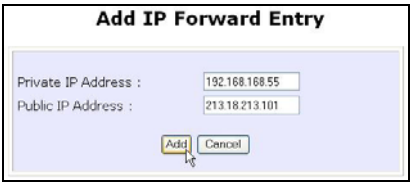
TO CONFIGURE VIRTUAL SERVERS BASED ON IP FORWARDING

When you have subscribed for more than one IP address from your ISP, you may define Virtual Servers based on IP Forwarding for which all Internet requests, regardless of ports, are forwarded to defined computers in the private network. If you require more information of its function, please refer to the NAT Technology Primer on the Product CD. Here are the steps to set it up:

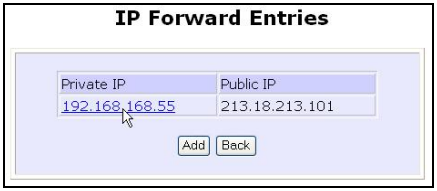
Step 1:
Under the **CONFIGURATION** command menu, click on **NAT**. You will find the **Advanced NAT Options** available near the bottom of the page.

Step 2:
Click the **IP Forwarding** button to configure Virtual Servers based on IP Forwarding.

Step 3:
At the next screen **Add IP Forward Entry**, you have to specify a **Private IP Address** and a **Public IP Address**. In this example, we would like all requests for 213.18.213.101 to be forwarded to a PC with **Private IP Address** 192.168.168.55.



Step 4:
Click the **Add** button to continue.



Step 5:
The **IP Forward Entries** page will reflect your new addition.

NOTE
For step 3 above, please ensure that you have subscribed to the Public IP Address you intend to forward from.

BANDWIDTH CONTROL (ONLY SUPPORTED BY WIRELESS ROUTING CLIENT AND GATEWAY)

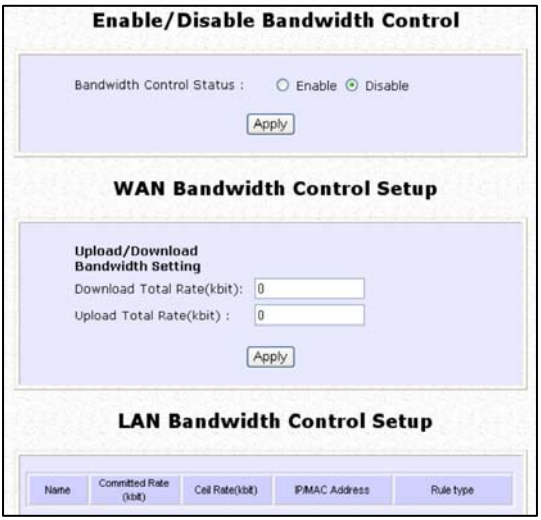
The access point is designed to support simple bandwidth management that makes use of the **Bandwidth Control**. This feature gives the administrator the choice to manage the bandwidth control of subscribers in case of massive data transfer which causes slowdown problems when surfing the Internet.

TO ENABLE OR DISABLE BANDWIDTH CONTROL

Only two simple steps are required to enable or disable bandwidth control for the access point.

Step 1:

Under the **CONFIGURATION** command menu, click on **Bandwidth Control**, and you will be brought to the following screen.



Step 2:
By default, **Bandwidth Control** is disabled. Select **Enable**, followed by clicking the **Apply** button.

TO CONFIGURE WAN BANDWIDTH CONTROL SETTING

The access point can allow you to limit the entire throughput by configuring the **Upload / Download Bandwidth Setting** option. These values should be set to a positive integer indicating the maximum number of kilobytes transferred per second that will be allowed. The value of zero means unlimited.

For example, if you configure the **Upload Total Rate** to be 640kb/sec (80KB/sec), then the access point will send out packets by this speed no matter how many clients/users are connected to it.

Step 1:
Under the **CONFIGURATION** command menu, click on **Bandwidth Control** to select **WAN Bandwidth Control Setup**.

Step 2:
The values for the **Download Total Rate** and **Upload Total Rate Bandwidth Control** are preset to zero. The value of zero indicates no limit and is the default. Key in the desired values, followed by clicking the **Apply** button.

TO CONFIGURE LAN BANDWIDTH CONTROL SETTING

The access point can allow you to limit the LAN user's throughput by configuring the **Bandwidth Control Rule**.

Step 1:
Under the **CONFIGURATION** command menu, click on **Bandwidth Control** to select **LAN Bandwidth Control Setup**.

Step 2:
Click **Add** to create the bandwidth rule for LAN user.

Step 3:
Click **Add** to create the rule for LAN user's bandwidth control.

This table describes the parameters that can be modified in the **Add Bandwidth Control Entry** page.

Parameters	Description
Rule Name	The rule describes the type of bandwidth traffic to be controlled and of a specification of what action to take when that bandwidth traffic is encountered.
Committed Rate (kbit)	This is the minimum bandwith rate at which a user can get the throughput.
Ceiling Rate (kbit)	This is the capped bandwith rate to limit a user's throughput.
Rule Type	This is the type of rule depending on which IP or MAC address to use to download or upload a user's throughput.
IP/MAC Address	This is the type of address to be chosen depending on the rule type. For instance, if you may want to limit an entirely machine address or a user by his router's MAC address, you can specify the MAC address using that field in the same way that you can limit by IP address.

Step 4:
After you have completed the parameters, click **Add** so that the new rule is added in the entry list shown in **Step 1**. To add more new bandwidth rules, repeat Step 1 through 3.

NOTE
The sum of **Committed Rate** of the rules should never exceed the corresponding **Total Rate**.

REMOTE MANAGEMENT (ONLY SUPPORTED BY WIRELESS ROUTING CLIENT AND GATEWAY)

The advanced network administrator will be delighted to know that remote management is supported on the access point. With this feature enabled, you will be able to access the access point's web-based configuration pages from anywhere on the Internet and manage your home/office network remotely.

TO SET UP REMOTE MANAGEMENT

Only two simple steps are required to set up remote management for the access point.

Step 1:
Under the **CONFIGURATION** command menu, click on **Remote Management**, and you will be brought to the following screen.

Step 2:
By default, **Remote Management** is disabled. (To disable Remote Management, just enter 0 for **Remote Http Port**).

To enable **Remote Management**, enter a port number which is not being used by other applications in the network. Please take note that it is recommended to use a different port number other than port 80 because some ISP block port number 80.

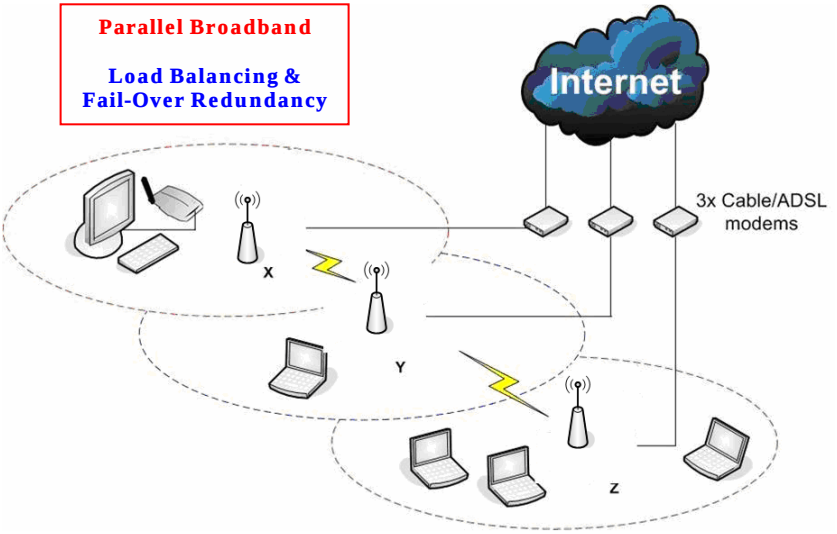
NOTE
In view of preventing unauthorized management from a remote location, please remember to replace the default password with a new one.

You are also advised to change this password from time to time to guard against malicious attackers.

PARALLEL BROADBAND (ONLY SUPPORTED BY GATEWAY)

The access point is equipped with the exclusive Parallel Broadband technology to provide scalable Internet bandwidth with Load Balancing and Fail-Over Redundancy.

By installing multiple units of the access point cascaded using Parallel Broadband, you may balance the Internet traffic generated from your private network over multiple broadband connections - providing the network with aggregated bandwidth! In the event of a particular broadband connection failing, The access point in cascade will use the remaining functional broadband channels, giving you an added peace of mind with its Fail-Over Redundancy capability.



To implement Parallel Broadband, you will need to install two or more access points in the network, each connected to its broadband Internet service account. There is no restriction to the type of broadband Internet accounts they are connected to (whether Cable or ADSL). You may thus have one Access point connected to Cable Internet, and another to an ADSL line. When these access points operate in the Gateway mode using Parallel Broadband, you need to configure them by firstly enabling Parallel Broadband, thus enabling the WDS, and finally setting these access points to the same ESSID.

TO ENABLE PARALLEL BROADBAND ON THE ACCESS POINT

Before you begin, ensure that each of the access point within the network is properly configured to connect to its individual broadband Internet account. Then ensure that either:

- each access point is connected to an Ethernet port in the network as illustrated above or
- the access points are interconnected by WDS or
- the access points are wired to each other.

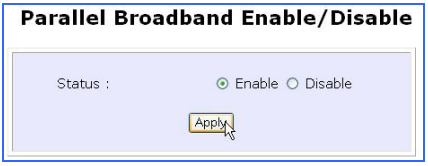
Finally, you are ready to access the web-based configuration of each of your access point to enable the Parallel Broadband feature. You will have to enable all the DHCP servers in all access points before enabling Parallel Broadband. Please note that you need to interconnect all access points

Step 1:

Under the **CONFIGURATION** command menu, click on **Parallel Broadband**.

Step 2:

Next simply select **Enable** and click the **Apply** button to make the changes effective.



Step 3:

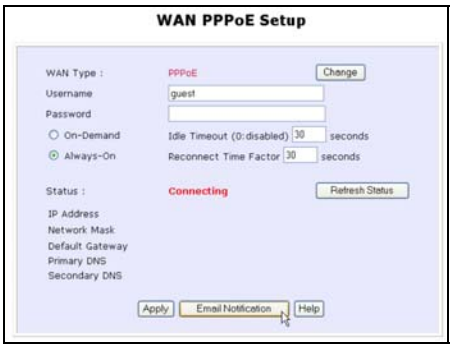
Repeat this for the other access points in your network and they will communicate with each other and assign each new user to the access point that has the smallest load, so that there is approximately the same number of users on each access point.

NOTE

Important:
If you have only one unit of the access point, you DO NOT need to implement the Parallel Broadband feature for broadband Internet sharing.

EMAIL NOTIFICATION

The access point provides this feature to notify you by email when there is a change in the WAN IP address that was supplied to you earlier.



Step 1:

Under the **CONFIGURATION** command menu, click on **WAN PPPoE Setup** or **WAN PPTP Setup**, and you will be brought to the following screen.

Step 2:

Click on the **Email Notification** button.

Step 3:

Click on the **Enable** button and key in the following fields as described below:

- **Email address of Receiver:**

This is the email address of the receiver to whom the message would be sent.

- **IP address of Email Server:**

This is the IP address of the SMTP server through which the message would be sent out. (Take note that you are encouraged to use your ISP's SMTP server).

- **User Name:**

This is the mail account user's name that should be entered if authentication is required.

- **Password:**

This is the mail account user's password that should be entered if authentication is required.

- **Email address of Sender:**

This is the email address of the sender from whom the message will appear to come.

Step 4:

By default, the checkbox next to **Needs Authentication** is not ticked. This option allows you to specify whether the SMTP server requires authentication.

Step 5:

Then click on the **Apply** button.

STATIC ADDRESS TRANSLATION (ONLY SUPPORTED BY WIRELESS ROUTING CLIENT AND GATEWAY)

If you use a notebook for work at the office, it is probable that you also bring it home to connect to the Internet and retrieve emails or surf the web. Since it is most likely that your office's and your home's broadband-sharing network subnets are differently configured, you would have to struggle with reconfiguring your TCP/IP settings each time you use the notebook in a different place. The access point provides the Static Address Translation (SAT) feature to enable its users to bypass this hassle.

Let's say that the IP address of your notebook is set to 203.120.12.47 at the workplace but the access point which is connecting your home network to the Internet, is using an IP address of 192.168.168.1. You have enabled SAT on your router and want to access the Internet without changing the IP address of the notebook as you have to use it at work again on the next day.

Since it is still set to the TCP/IP settings used in your office, the notebook will then try to contact the IP address of your office's gateway to the Internet. When the access point finds that the notebook is trying to contact a device which lies in a different subnet from that of the home network, it would then inform the notebook that the gateway to the Internet is in fact itself (Access Point).

Once the notebook has been informed that the gateway to the Internet is the access point, it will contact the latter (Access Point) to access the Internet, without any change to its TCP/IP settings required.

NOTE

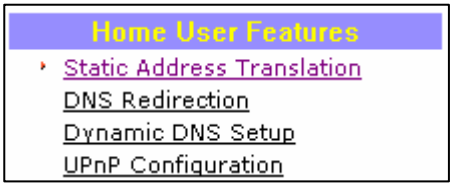
For SAT to function properly:

1. The IP address of the notebook should belong to a different subnet from the LAN IP address of your access point.

2. The <Default Gateway> in the TCP/IP settings of your notebook should NOT be left blank.

Step 1:

Under the **Home User Features** command menu, click on **Static Address Translation**.



Step 2:

You may then choose to **Enable** or **Disable** Static Address Translation here, followed by clicking the **Apply** button. (Note: SAT is disabled by default)

DNS REDIRECTION (ONLY SUPPORTED BY WIRELESS ROUTING CLIENT AND GATEWAY)

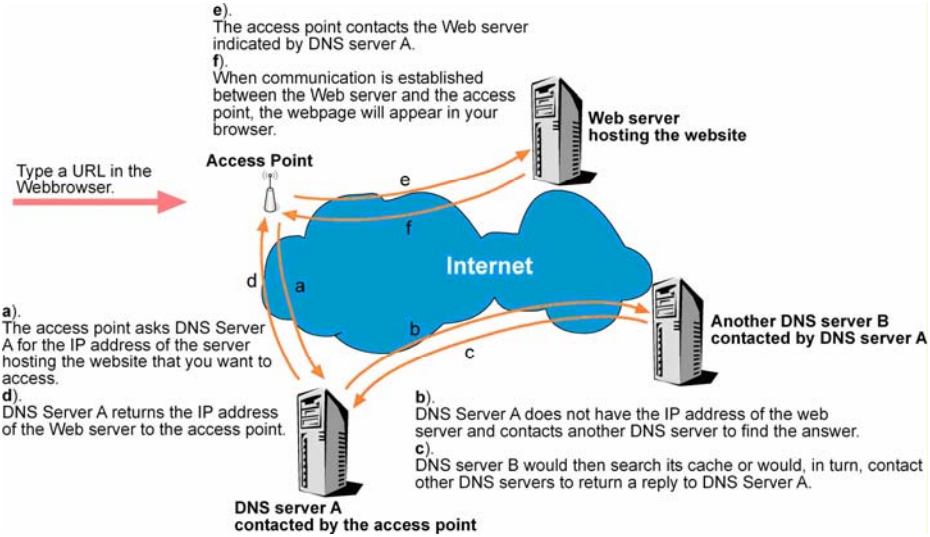
When you enter a URL in your Internet browser, the browser requests for a name-to-IP address translation from the Domain Name System (DNS) servers to be able to locate the web server

The DNS server, in turn, looks for the answer in its local cache and if an appropriate entry is found, sends back this cached IP address to the browser. Otherwise, it would have to contact other DNS servers until the query can be resolved.

When you enable the DNS Redirection feature, DNS requests from the LAN clients will be processed by Access point. Unless in the access point's LAN Setup you have already assigned a specific DNS server which should always be used, the access point would contact the DNS server allocated by your ISP to resolve DNS requests.

When DNS Redirection is enabled, the DNS server used by the access point would override the one defined in the TCP/IP settings of the LAN clients. This allows the access point to direct DNS requests from the LAN to a local or to a closer DNS server it knows of, thus improving response time.

The DNS Redirection feature also provides better control to the network administrator. In case of a change in DNS servers, the latter can just indicate the IP address of the actual DNS server in the access point's LAN Setup and enable DNS Redirection, without having to re-configure the DNS settings of each LAN client.

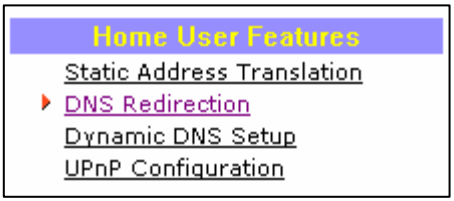


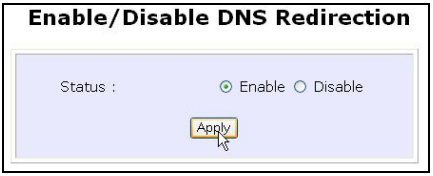
NOTE

For Internet access, please do NOT leave the DNS Server field of the PC's TCP/IP Properties blank. Simply key in any legal IP address for it (e.g. 10.10.10.10) even though you do not have the exact DNS IP address.

TO ENABLE/DISABLE DNS REDIRECTION

Step 1:
Under the **Home User Features** command menu, click on **DNS Redirection**.





Step 2:
Simply choose **Enable** or **Disable** for the **Status** of **DNS Redirection**.

Step 3:
Complete the setup by clicking the **Apply** button.

DYNAMIC DNS SETUP

It is difficult to remember the IP addresses used by computers to communicate on the Internet. It gets even more complicated when ISPs change your public IP address regularly, as is the case when the Internet connection type is Dynamic IP or PPPoE with Dynamic IP.

If you are doing some web hosting on your computer and are using Dynamic IP, Internet users would have to keep up with the changing IP address before being able to access your computer.

When you sign up for an account with a Dynamic Domain Name Service (DDNS) provider, the latter will register your unchanging domain name, e.g. **MyName.Domain.com**. You can configure your access point to automatically contact your DDNS provider whenever the access point detects that its public IP address has changed. The access point would then log on to your account and update it with its latest public IP address.

If someone types in your address: **MyName.Domain.com** into their web browser, this request would go to the DDNS provider which would then re-direct that request to your computer, no matter what IP address it has been currently assigned by your ISP.

TO ENABLE/DISABLE DYNAMIC DNS SETUP

Step 1:
Under the **Home User Features** command menu, click on **Dynamic DNS Setup**.

Step 2:
You may then choose to **Enable** or **Disable** Dynamic DNS here, followed by clicking the **Apply** button. (Note: Dynamic DNS is disabled by default)

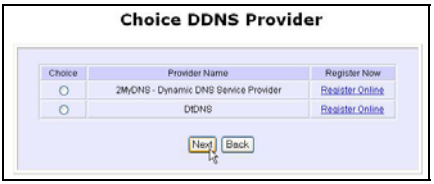
TO MANAGE DYNAMIC DNS LIST (DDNS)

Step 1:
Under the **Home User Features** command menu, click on **Dynamic DNS Setup**.

Step 2:
If you have already created a list earlier, click on the **Refresh** button to update the list.

Step 3:

To add a new Dynamic DNS to the list, click on the Add button and you will see the **Choice DDNS Provider** page appear. There are two default providers which you can use. The following parameters are explained below:



- **Choice** :

This allows you to check the radio button of your preferred DDNS provider.

- **Provider Name :**

This is the name of your preferred DDNS provider.

- **Register Now** :

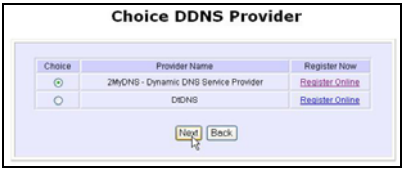
This allows you to go to the website of your preferred DDNS provider where you can register your account.

There are two DDNS providers that are pre-defined for you. Please note that you need to be connected to the Internet to register your DDNS account.

To select **2MyDNS – Dynamic DNS Service Provider** as DDNS Service Provider

Step 1:

Under the **Choice** column in the **Choice DDNS Provider** check the radio button next to the **2MyDNS – DNS Service Provider**. Then click on the **Next** button to proceed.

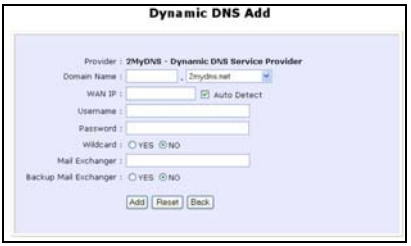


Step 2:

Enter your **Domain Name**.

Step 3:

The **Auto Detect** checkbox is ticked by default. The **WAN IP** entry box is blank by default. These default settings should be applied if the dynamic WAN IP connection is used.



For instance,
If your ISP connection service uses the dynamic WAN IP, tick the **Auto Detect** checkbox to let the DDNS server learn your current WAN IP address. Enter your DDNS account **Username** and **Password**.

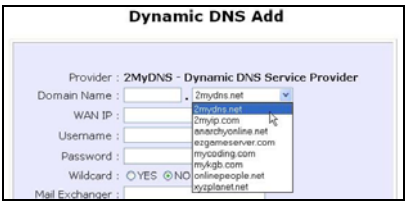
However, if you are using a fixed WAN IP connection, enter the IP address in the **WAN IP** field. Then, un-tick the **Auto Detect** checkbox. Then the access point will update the DDNS server using that WAN IP entered in its field.

Step 4:

(Optional) If you enable the wildcard service, your hostname would be allowed multiple identities.
For example, if you register: **mydomain.2mydns.net**,
users looking for
www.mydomain.2mydns.net or
ftp.mydomain.2mydns.net can still reach your hostname.

Step 5:

(Optional) In the Mail Exchanger field, enter the Static WAN IP address of the mail server configured to handle email for your domain. Select **Backup Mail Exchanger** to enable this service.

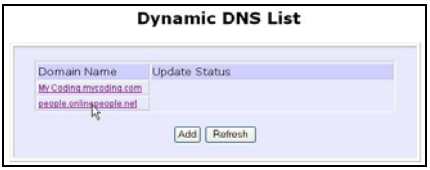


Step 6:

Click on the Add button to save the new addition.

Step 7:

The new domain is added to the Dynamic DNS list table.



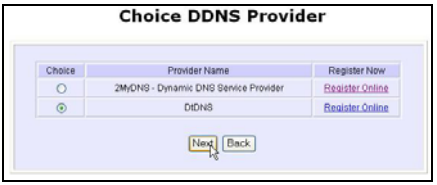
Step 8:

It will appear as a hyperlink which you can click to go back to the Dynamic DNS Edit page. From this page, you can update any of the parameters, delete the domain name or reset all parameters to be blank again.

To select **DtDNS as** DDNS Service Provider

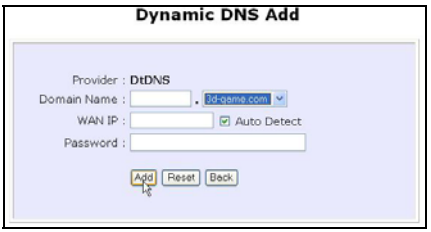
Step 1:

Under the **Choice** column in the table of **Choice DDNS Provider** check the radio button next to the **DtDNS**. Then click on the **Next** button to proceed.



Step 2:

Enter your **Domain Name**.



Step 3:

The **Auto Detect** checkbox is ticked by default. The **WAN IP** entry box is blank by default. These default settings should be applied if the dynamic WAN IP connection is used.

For instance,

If your ISP connection service uses the dynamic WAN IP, tick the **Auto Detect** checkbox to let the DtDNS server learn your current WAN IP address. Enter your DtDNS account **Username** and **Password**.

However, if you are using a fixed WAN IP connection, enter the IP address in the **WAN IP** field. Then, un-tick the **Auto Detect** checkbox. Then the access point will update the DtDNS server using that WAN IP entered in its field.

Step 4:

Then click on the **Add** button.

Step 5:

In our example, while the new domain name, **cool.3d-game.com** is being added to the list, the message 'Waiting in queue...' will be displayed under the **Update Status** column of the **Dynamic DNS List** table.

Chapter 8: Security Configuration

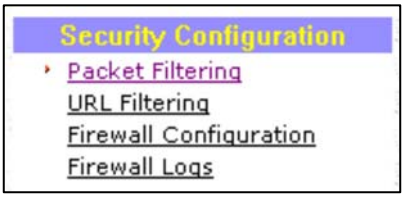
This chapter describes the security configuration mainly found in the **Wireless Routing Client** and **Gateway** modes.

PACKET FILTERING

As part of the comprehensive security package found on the access point, you may perform IP packet filtering to selectively allow/disallow certain applications from connecting to the Internet.

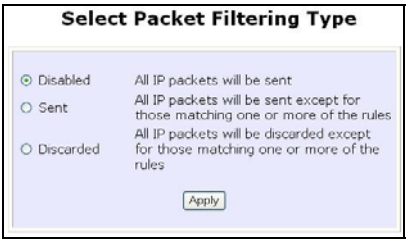
TO CONFIGURE PACKET FILTERING

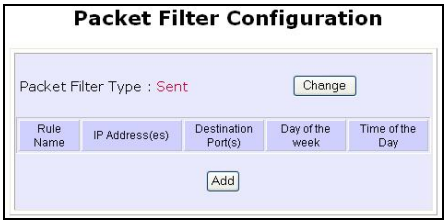
Step 1:
Under the **Security Configuration** command menu, click on **Packet Filtering**.

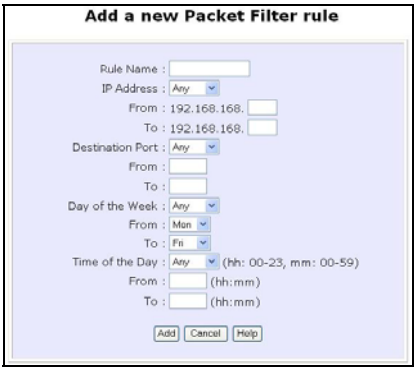


Step 2:
You must first choose the **Packet Filter Type** by clicking on the **Change** button.

Step 3:
Select from three choices: **Disabled**, **Sent**, **Discarded**, then click on the **Apply** button. The default is **Disabled**, which allows all packets to be sent.







Step 4:

Click on the **Add** button and you will be able to define the details of your **Packet Filter Rule** from the screen on the right.

4a). Enter **Rule Name** for this new packet filtering rule. For example, *BlockCS*

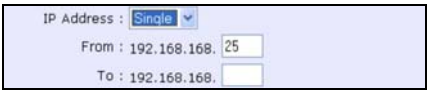
4b). From the **IP Address** drop down list, select whether to apply the rule to:

- A **Range** of IP addresses

In this case, you will have to define **(From)** which IP address **(To)** which IP address, your range extends.

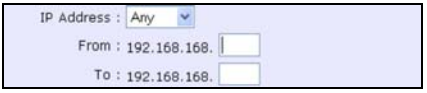
- A **Single** IP address

Here, you need only specify the source IP address in the **(From)** field.



- **Any** IP address

You may here, leave both, the **(From)** as well as the **(To)** fields, blank. Here, the rule will apply to all IP addresses.



4c). At the **Destination Port** drop down list, select either:

- A **Range** of TCP ports

In this case, you will have to define **(From)** which port **(To)** which port, your rule applies.

- A **Single** TCP port

Here, you need only specify the source port in the **(From)** field.

- **Any** IP port

You may here, leave both, the **(From)** as well as the **(To)** fields, blank. Here, the rule will apply to all ports.

4d). From the **Day of the Week** drop down list, select whether the rule should apply to:

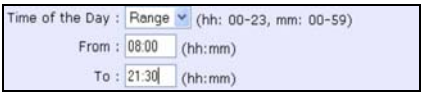
- A **Range** of days

Here, you will have to select **(From)** which day **(To)** which day

- **Any** day

In this case, you may skip both the **(From)** as well as the **(To)** drop down fields.

4e). At the **Time of the Day** drop down list, you may also choose to apply the rule to:



- A **Range** of time

In which case, you have to specify the time in the format **HH:MM,** where **HH** may take any value from 00 to 23 and **MM,** any value from 00 to 59.

- **Any** time

Here, you may leave both **(From)** and **(To)** fields blank.

Step 5:

Click on the **Apply** button to make the new rule effective.

The **Filtering Configuration** table will then be updated.

Step 6:

In this example, let us say we would like to block an application called CS from all PCs (any IP address within the network) from Monday to Friday 7am to 6pm, and this application is using the port number 27015.

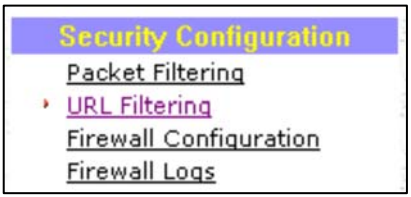
Therefore, for a rule we name BlockCS, and add the entries depicted on the left. Clicking on the **Add** button will make your packet filter rule effective.

URL FILTERING

The access point supports URL Filtering which allows you to easily set up rules to block objectionable web sites from your LAN users.

TO CONFIGURE URL FILTERING

Step 1:
Under the **Security Configuration** command menu, click on **URL Filtering.**



Step 2:
You may now define the **URL Filter Type** by clicking the **Change** button.

Step 3:
Select **Block** or **Allow**, and then click on the **Apply** button. The default is **Disabled**, which allows all websites to be accessed.

When you will be returned to the page shown above, then click the **Add** button.

Step 4:
For the **Host Name** field, input the web site address that you wish to block. Then click the **Add** button to complete your setup.

FIREWALL CONFIGURATION

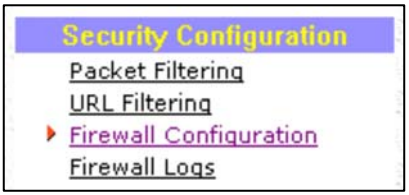
More than just a "NAT" firewall, there is a powerful Stateful Packet Inspection (SPI) firewall option that can be activated on the access point. Stateful inspection compares certain key parts of the packet to a database of trusted information before allowing it through. Common hacker attacks like IP Spoofing, Port Scanning, Ping of Death and SynFlood can be easily thwarted with the access point's SPI firewall.

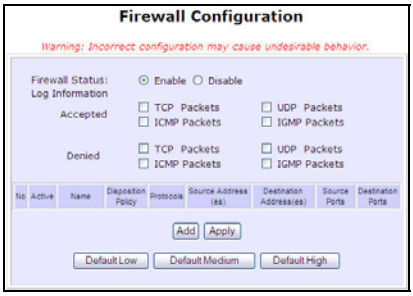
TO CONFIGURE SPI FIREWALL

The following steps explain the configuration of the access point's SPI firewall. As incorrect configuration to the firewall can result in undesirable network behavior, you are advised to carefully plan your firewall security rules.

Step 1:

Under the **Security Configuration** command menu, click on **Firewall Configuration**.





Step 2:

First, enable the firewall. You can choose among the **Default Low**, **Default Medium** or **Default High** security options for convenient setup.

Step 3:

Then you may choose the type of network activity information you wish to log for reference. Data activity arising from different types of protocol can be recorded.

The packet types that you have selected in the **Accepted** section will be displayed in the firewall log if they are detected by the firewall. This also applies to the **Denied** section.

Step 4:

You may add more firewall rules for specific security purposes. Click on the **Add** radio button at the screen shown above, followed by the **Edit** button and the screen on the left will appear.

Rule Name	:	Enter a unique name to identify this firewall rule.
Disposition Policy	:	This parameter determines whether the packets obeying the rule should be accepted or denied by the firewall. Choose between Accept or Deny.
Protocols	:	Users are allowed to select the type of data packet from: TCP, UDP, ICMP, IGMP or ALL. Note: If users select either ICMP or IGMP, they are required to make further selection in the ICMP Types or IGMP Types respectively.

ICMP Types : This IP protocol is used to report errors in IP packet routing. ICMP serves as a form of flow control, although ICMP messages are neither guaranteed to be received or transmitted.

ICMP Packet Type	Description
Echo request	Determines whether an IP node (a host or a router) is available on the network.
Echo reply	Replies to an ICMP echo request.
Destination unreachable	Informs the host that a datagram cannot be delivered.
Source quench	Informs the host to lower the rate at which it sends datagrams because of congestion.
Redirect	Informs the host of a preferred route.
Time exceeded	Indicates that the Time-to-Live (TTL) of an IP datagram has expired.
Parameter Problem	Informs that host that there is a problem in one the ICMP parameter.
Timestamp Request	Information that is from the ICMP data packet.
Information Request	Information that is from the ICMP data packet.
Information Reply	Information that is from the ICMP data packet.

IGMP Types : This IP protocol is used to establish host memberships in particular multicast groups on a single network. The mechanisms of the protocol allow a host to inform its local router, using Host Membership Reports.

Host Membership Report	Information that is from the IGMP data packet.
Host Membership Query	Information that is from the IGMP data packet.
Leave Host Message	Information that is from the ICMP data packet.

Source IP : This parameter allows you to specify workstation(s) generating the data packets. Users can either set a single IP address or set a range

of IP addresses.

Destination IP : This parameter lets you specify the set of workstations that receive the data packets. Users can either set a single IP address or set a range of IP addresses.

Source Port : You can control requests for using a specific application by entering its port number here. Users can either set a single port number or a range of port numbers.

Destination Port : This parameter determines the application from the specified destination port. Users can either set a single port number or a range of port numbers.

Check Options : This parameter refers to the options in the packet header. The available selection options are abbreviated as follows:

SEC – Security
LSRR – Loose Source Routing
Timestamp – Timestamp
RR – Record Route
SID – Stream Identifier
SSRR – Strict Source Routing
RA – Router Alert

Check TTL : This parameter would let you screen packets according to their Time-To-Live (TTL) value available options are:

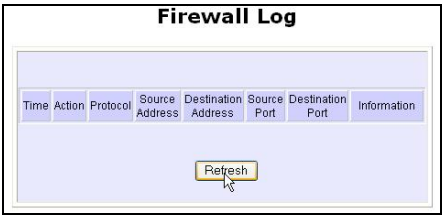
1. Equal
2. Less than
3. Greater than
4. Not equal

FIREWALL LOGS

When the access point's SPI firewall is in operation, valuable traffic patterns in your network will be captured and stored into the Firewall Logs. From these logs, you can extract detailed information about the type of data traffic, the time, the source and destination address/port as well as the action taken by the SPI firewall. You can choose which type of packets to log from the **Firewall Configuration**.

TO VIEW FIREWALL LOGS

Step 1:
Under the **SECURITY CONFIGURATION** command menu, click on **Firewall Logs.**



Step 2:
Click the **Refresh** button to see new information captured in the log.

Chapter 9: System Utilities

USING THE SYSTEM TOOLS MENU

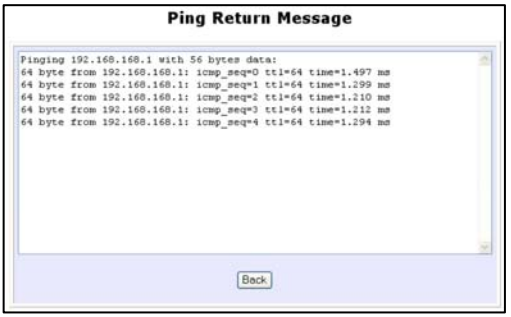
PING UTILITY

This feature lets you determine whether your access point can communicate (ping) with another network host. This feature is available only for the **Wireless Routing Client** and **Gateway** modes.

Step 1:
Select **Ping Utility** under the **SYSTEM TOOLS** command menu.

Step 2:
Enter the IP address of the target host where the target host you want the access point to ping to.

Step 3:
To ping the access point, click **Start**.



Step 4:
The Ping messages will be displayed.

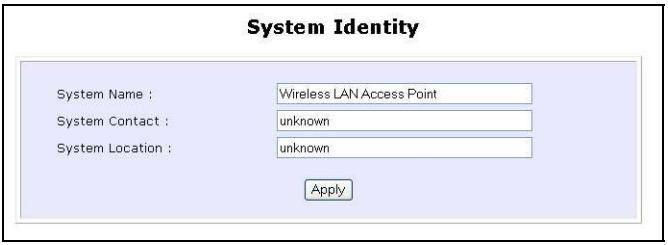
SYSTEM IDENTITY

If your network operates with several access points, you would find it useful to have a means of identifying each individual device.

You can define the **System Identity** of your access point to be uniquely identifiable as follows:

Step 1:

Click on **System Identity** from the **SYSTEM TOOLS** menu.



Step 2:

Enter a unique name in the **System Name** field.

Step 3:

Fill in the name of a person to contact in the **System Contact** field.

Step 4:

Fill up the **System Location** field. If there are multiple devices in your network or building, this entry might help to identify the device location.

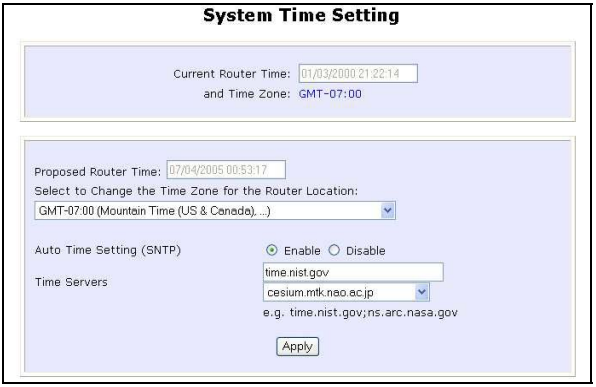
Step 5:

Click on the **Apply** button to effect the changes.

SET SYSTEM'S CLOCK

Step 1:

Click on **Set System's Clock** from the **SYSTEM TOOLS** menu.



Step 2:

Select the appropriate time zone from the **Select to Change the Time Zone for the Router Location** drop-down list.

Step 3:

Enable the Auto Time Setting (SNTP) radio button. **SNTP** stands for Simple Network Time Protocol and is used to synchronise computer clocks.

Step 4:

Fill in the **Time Servers** field and click on the **Apply** button to effect the changes.

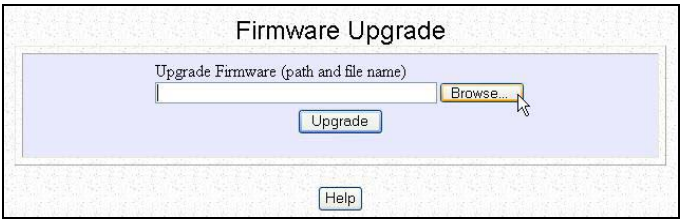
FIRMWARE UPGRADE

You can check the types and version of your firmware by clicking on **About System** from the **HELP** menu.

To begin with, ensure that you have downloaded the latest firmware onto your local hard disk drive.

Step 1:

Click on **Firmware Upgrade** from the **SYSTEM TOOLS** menu.



Step 2:

Click on the **Browse** button to locate the file.

Step 3:

Click on the **Upgrade** button.

Follow the instructions given during the upgrading process.

Step 4:

You need to reboot the system after the firmware upgrade.

NOTE
The firmware upgrade process must NOT be interrupted otherwise the device might become unusable.

BACKUP OR RESET SETTINGS

You may choose to save the current configuration profile, to make a backup of it onto your hard disk, to restore an earlier profile saved on file or to reset the access point back to its default settings.

RESET YOUR SETTINGS

Step 1:

Click on **Backup or Reset Settings** from the **SYSTEM TOOLS** menu.

Step 2:

To discard ALL the configuration you have made and restore the access point to its initial factory settings, click on **Reset** button.

Step 3:

The system will prompt you to reboot your device. Click on the **Reboot** button to proceed.

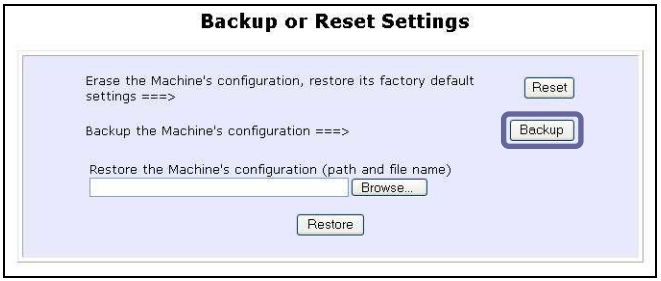
BACKUP YOUR SETTINGS

Step 1:

Click on **Backup or Reset Settings** from the **SYSTEM TOOLS** menu.

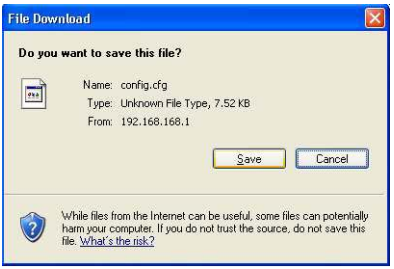
Step 2:

If you want to back up the current settings of your access point onto your hard disk drive, click on the **Backup** button.



Step 3:

Next, save your configuration file to your local disk.



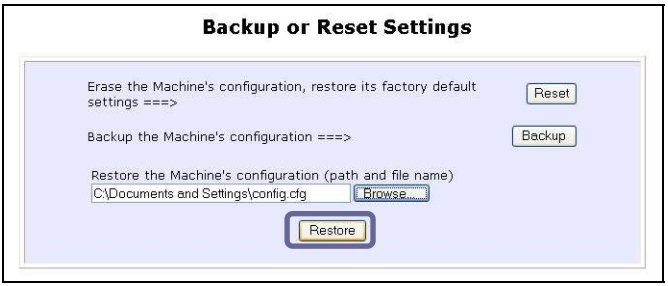
RESTORE YOUR SETTINGS

Step 1:

Click on **Backup or Reset Settings** from the **SYSTEM TOOLS** menu.

Step 2:

If you want to store back the settings that you had previously saved, click on the **Browse...** button. Proceed to the folder where you saved your configuration file.



Click on the **Restore** button and the system will prompt you to reboot your device.

REBOOT SYSTEM

Most of the changes you make to the system's settings require a system reboot before the new parameters can take effect.

Step 1:

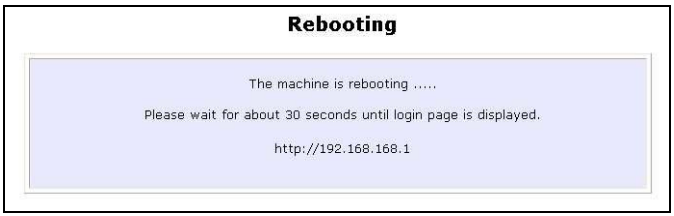
Click on **Reboot System** from the **SYSTEM TOOLS** menu.

Step 2:

Click on the **Reboot** button.

Step 3:

Wait for the system to reboot and the login page will be displayed.



CHANGE PASSWORD

It is recommended that you change the default login password, which is case sensitive and is set by default, to **password**.

Step 1:

Click on **Change Password** from the **SYSTEM TOOLS** menu.

Step 2:

Key in the **Current Password**. The factory default is *password*.

Enter the **new password** in the **New Password** field as well as in the **Confirm Password** field.

Step 3:

Click on the **Apply** button to update the changes.

LOGOUT

To exit the Web interface, follow the next few steps.

Step 1:

Click on **Logout** from the **SYSTEM TOOLS** menu.

Step 2:

Click the **LOGIN!** button to access your access point's configuration interface again.

USING THE HELP MENU

ABOUT SYSTEM

The **About System** page displays a summary of your system configuration information. Support technicians might require specific information about your system data when they are troubleshooting your configuration. You can use the information displayed in this page to quickly find the data they need to resolve your system problem.

Step 1:

Click on **About System** from the **HELP** menu.

The **System Information** page will supply information concerning your access point's configuration settings.

System Information

Device:	
System Up Time :	0 Days 00:24:54
BIOS/Loader Version :	2.0 (build 0027)
Firmware Version :	1.00 (build 0706)
NetWork Mode :	Inherent Bridge
Wireless:	
Hardware Address :	00-80-45-37-86-dd
WLAN name (ESSID):	Wireless-G AP
Operating frequency :	2457MHz
Operating Channel :	10
Security mode :	WPA-PSK-AUTO
Management Port:	
Hardware Address :	00-80-45-37-86-dc
IP Address :	192.168.168.1
Network Mask :	255.255.255.0
DHCP Server :	Disable

Appendix I: Firmware Recovery

This section demonstrates how to reload the firmware to the access point should the system fail to launch properly. In such cases, the access point will automatically switch to loader mode and the diagnostic LED will light up and remain ON.

The table below illustrates the behavior of the diagnostic LED ( ).

Access point State	Diagnostic LED ( ) State
Corrupted firmware – access point automatically switches to loader mode	Blinks very fast
Recovery in progress	ON
Successful recovery	Blinks very slowly

Before starting, check the status of the diagnostic LED against the table above to confirm whether firmware failure has occurred.

Step 1:

Power the access point off and disconnect it from the network.

Step 2:

Use a MDI cable to connect the LAN port of the access point to the LAN port of your computer.

Step 3:

Power the access point on, and then start up your computer. You are recommended to set your computer's IP address to 192.168.168.100 and its network mask to 255.255.255.0.

Step 4:

Insert the Product CD into the CD drive of your computer.

Step 5:

From the **Start** menu, click **Run** and type **cmd**. When the command prompt window appears, type in the following command:

X:\recovery\TFTP -i 192.168.168.1 PUT image_name.IMG, where **X** refers to your CD drive and **image_name.IMG** to the firmware filename found in the Recovery folder of the Product CD.

Step 6:

If you have downloaded a newer firmware and have saved it in your local hard disk as: **C:\EP54G1A\541Axxx.IMG**, then replace the command with this new path and firmware name. In our example:
C:\ EP54G1A \TFTP –i 192.168.168.1 PUT 541Axxx.img

The recovery process will now take place. You can check the diagnostic LED to monitor the progress of the recovery process.

When firmware restoration has completed, reboot the access point and it will be ready to operate.

Appendix II: TCP/IP Configuration

Once the hardware has been set up, you need to assign an IP address to your PC so that it will be in the same subnet as the access point. By default, the access point's IP address is 192.168.168.1; and its subnet mask is 255.255.255.0. You need to configure your PC's IP address to 192.168.168.xxx; and its subnet mask is 255.255.255.0, where xxx can be any number from 2 to 254 excluding 1. Simply follow the procedures stated below to configure the TCP/IP settings of your PC.

FOR WINDOWS 95/98/98SE/ME/NT

Please note the following instructions are based on Windows 98.

Step 1:

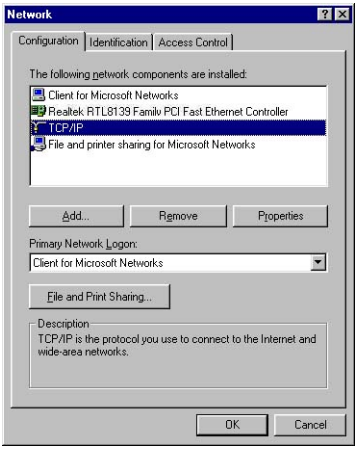
From your desktop, click on **Network Neighborhood** icon and select **Properties**.

Step 2:

Choose the network adapter that you are using; right click and select **Properties**.

Step 3:

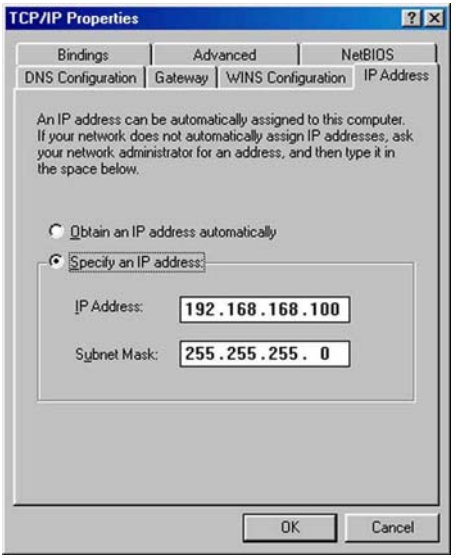
Highlight the **TCP/IP** and click on **Properties** button.



Step 4:

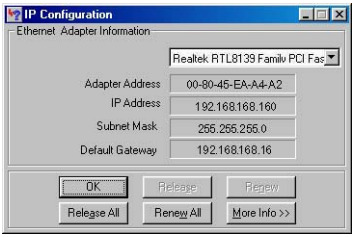
Select the radio button for **Specify an IP address**.

Enter the IP Address and Subnet Mask as 192.168.168.X and 255.255.255.0, where X can be any number from 2 to 254, except for 1. In this example, we are using 192.168.168.100 as the static IP Address.



Step 5:

In order to check if the IP address has been assigned correctly to your PC, simply go to the **Start** menu, select **Run,** and enter the command *winipcfg*.



Select your respective Ethernet Adapter from the drop down list and click **OK**.

Now, your PC is now ready to communicate with your access point.

FOR WINDOWS XP/2000

Step 1:

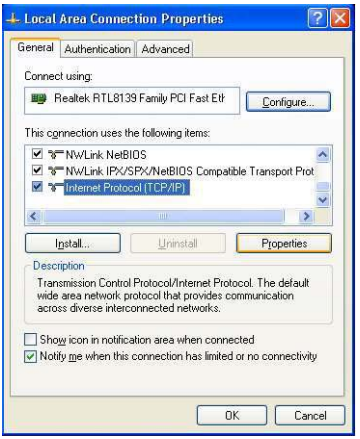
Go to your desktop, right-click on **My Network Places** icon and select **Properties**.

Step 2:

Go to your network adapter icon, right click and select to **Properties**.

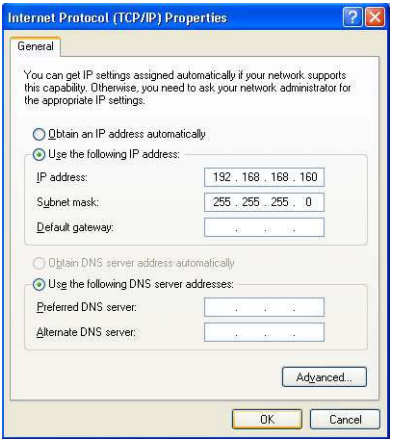
Step 3:

Highlight **Internet Protocol (TCP/IP)** and click on **Properties** button.



Step 4:

Select the radio button for **Use the following IP address**. Enter the IP Address and Subnet Mask as 192.168.168.X and 255.255.255.0, where Xcan be any number from 2 to 254, except for 1. In this example, we are using 192.168.168.160 as the static IP Address.

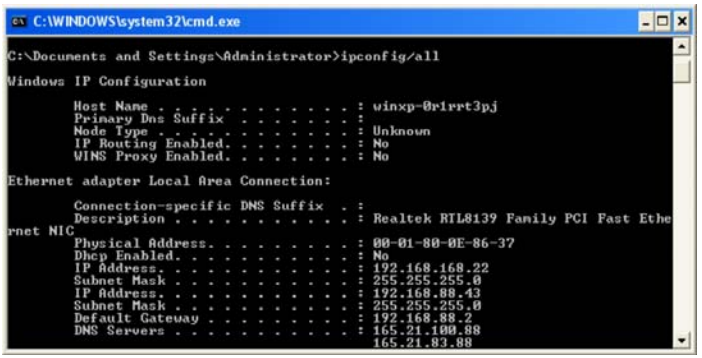


Step 5:

Click on **OK** to close all windows.

Step 6:

Next, in order to check if the IP address has been correctly assigned to your PC, go to **Start** menu, **Accessories**, select **Command Prompt** and type the command *ipconfig/all*.

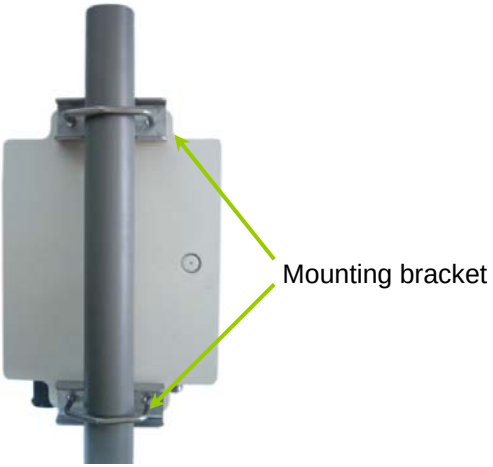


Your PC is now ready to communicate with your access point.

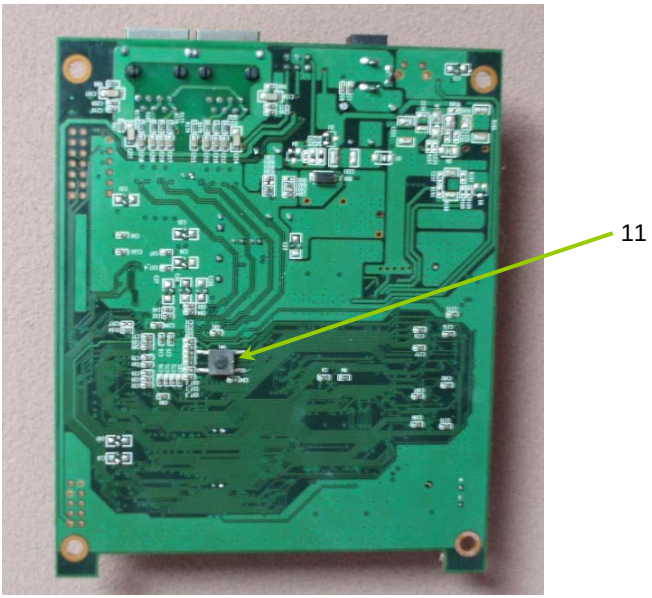
Appendix III: Panel Views & Descriptions

Front View of Access Point

Back View of Access Point



Bottom View of Access Point Board



	Name	Description
11	Reset Push button	To reboot, press once. To reset password, press and hold the button for 5 seconds. The DIAG light will flash fast for about 5 flashes/sec before releasing the button. To restore the factory default settings, press and hold the button for more than 10 seconds. The DIAG light will flash slowly for about 10 flashes/sec before releasing the button.

Appendix IV: Technical Specifications

Model	AIR-BR500G	AIR-BR500GH	AIR-BR500AG
Ethernet Port	Ethernet 10/100Base-TX (RJ-45)		
Operating Frequency / Channel	2.400 ~ 2.497 GHz Programmable for different country regulations		**802.11b/g:** 2.400 ~ 2.497 GHz **802.11a:** 5.15~5.35 & 5.725~5.850 GHz (US) 5.15~5.35 GHz & 5.47~5.725GHz(Europe)
RF Modulation	**802.11b:** DSSS (DBPSK, DQPSK, CCK) **802.11a/g:** OFDM (BPSK,QPSK, 16-QAM, 64-QAM)		
RF Output Power	20dBm	23dBm	20dBm
Sensitivity	**802.11b:** -95dB@1Mbps, -94dB@2Mbps, -92dB@5.5Mbps, -90dB@11Mbps **802.11a/g:** -90dB@6Mbps, -89dB@9Mbps, -87@12Mbps, -85dB@18Mbps, -82dB@24Mbps,- 79dB@36Mbps, -76dB@48Mbps, -74dB@54Mbps		
Data Rate	54, 48, 36, 24, 18, 12, 11, 5.5, 2, 1Mbps		
RF Operation Mode	Access Point Client mode Point to Point Point to Multiple Point Wireless Routing Client Wireless Adapter Gateway		
Range	Up to 10 miles (16 Km) with 24dBi Parabolic Grid antenna	Up to 15 miles (24 Km) with 24dBi Parabolic Grid antenna	Up to 20 miles (32 Km) with 32.5dBi Parabolic Dish antenna in 5GHz
Data Security	WEP 64/128/152 - bit Mac Address Filtering IEEE 802.1x—TLS, TTLS, PEAP WPA-PSK and WPA-EAP, WPA2 (with AES encryption technique)		

Technical Specifications

Network Advanced Features	IP Routing - static Routing, NAT and Port Forwarding (Wireless Routing Client and Gateway mode only) WDS - Wireless Distribution System PPPoE Client (Wireless Routing Client and Gateway mode only) PPTP for VPNs Network 802.1d Spanning Tree Protocol SNMP support DHCP Server and Client Bandwidth Control Pseudo VLAN technology Proprietary Long Distance Algorithm for ACK and CTS timeout adjustment support Firewall and Packet/URL Filtering (Wireless Routing Client and Gateway mode only) Load Balancing & Fail-Over Redundancy (Gateway mode only)
Link parameters	Antenna alignment and RSSI Signal levels Site Survey Radio and Ethernet Traffic Statistics
Management	Web and utility Windows based
Antenna Connector	N Female
Power	Power over Ethernet - PoE (AC 110~220/DC 12V)
Dimensions L x W x H	10” x 7.1” x 2.25” (254 x 180 x 57mm)
Weight	5.2 Lb (2.4 Kg.) include PoE Injector, Mounting Brackets and accessories
Humidity	-10-90%, (Operating)
Temperature	-30~70 degree C (Operating)
Electromagnetic Compatibility	FCC Part 15 class B, CE Mark, ETSI 300 328